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The Emergence of the General Adaptation Syndrome in Contemporary Health Disparities Discourse

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B.A., Allegheny College, 2001

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An Abstract of
A thesis submitted to the Faculty of the Graduate School of Emory in partial fulfillment
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Abstract

The Emergence of the General Adaptation Syndrome in
Contemporary Health Disparities Discourse

By Deanne Dunbar

The following is an intellectual history of stress research from the characterization of the physiological stress response by endocrinologists in the 1930's to the utilization of this basic science research in the contemporary discussion of differential well-being by race. After the description of stress in the laboratory, its cooptation by a variety of disciplines resulted in a broadening of its definition and in particular alterations of its meaning. Since these changes make our contemporary understanding of stress possible, it is useful to examine the circumstances in which they occurred.

This paper also undertakes an analysis of the long-standing assertion that modernization is a cause of increased stress and chronic disease. The persistence of this view is attributed to the influence of social theory upon explanatory models of modernization in the social sciences. I argue that mergers between biology and the social sciences allow the physiological concepts of *milieu intérieur* and homeostasis to reflect onto society a Durkheimian ideal of social stability.

As stability becomes defined by sociology and social epidemiology in public health, it positions stress as an inherent characteristic of communities and environments. In social epidemiology, the operationalizing of measures of social embeddedness and cohesion fit the holistic biological perspective which posits the fit between an individual and his environment as a determinant of health. These directions for stress research have particular implications for the role of human action in response to stress and the construction of vulnerability.

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Contents

Introduction

The primary aim of this paper is to determine the pathway from the discovery of the General Adaptation Syndrome, a stereotyped set of biological changes in response to stress, in a laboratory in Canada in 1936 to its present day utilization in American discourses about racism and health inequity. This journey will entail an account of the emergence of endocrinology as a medical specialty; the construction of the circumstances of stress, of significant life events, and of human adaptation by sociologists and anthropologists in the social and behavioral sciences; and the appearance of stress and stressors in the epidemiology and behavioral sciences disciplines in public health. In sum, my work here is both an intellectual history of stress and a case study of the translation of basic science research into American social policy.

As I will argue, the joining of the physiological stress response and American culture required changes to the definition of stress and stressors after these were delimited in the laboratory. In fact in many ways, modern definitions of this concept do not resemble the original at all. This evolution of meaning is not only the result of progress in the scientific study of stress; it is also the result of its cooptation by other disciplines and the changing utility of the concept, and of science, in American culture. Laurence J. Kirmayer, Robert Lemelson, and Mark Barad introduce their 2007 edited collection, *Understanding Trauma: Integrating Biological, Clinical, and Cultural Perspectives*, with their contention that stresses and traumas are not natural categories, but rather "culturally constructed ways to mark out certain classes of experiences and

events."[1] This definition reminds us that history is integral to any study of stress and disease. An historical perspective illustrates very clearly that there has never been a monolithic or ultimate concept that we can call stress; instead there are archetypes and cultural models that have changed over time, "along with our ways of thinking about illness and suffering, our concepts of mind and personhood, and the moral politics of victimhood, blame, and accountability."[2] Thus this history of stress will not read as a narrative of progress toward "greater clarity about a concept with a fixed meaning," but rather will elucidate the contingent nature of stress as a concept amid "changing social constructions of experience, in the context of particular clinical, cultural, and political ideologies."[3]

It is useful to begin a brief review of the origin of the concept of stress with physical trauma as it appears in mid-seventeenth century medical literature. In this context, "trauma" was employed to describe bodily wounds and the condition was studied primarily by surgeons.[4] A century later, society "nerve doctor" George Cheyne also conceptualized the experience of stress or trauma as a physical disorder of the nerves rather than a psychic condition.[5] His 1733 book, *The English Malady; or, A Treatise of Nervous Diseases of All Kinds, as Spleen, Vapours, Lowness of Spirits, Hypochondriacal and Hysterical Distempers*, popularized the diagnosis. The broad acceptance of this diagnostic can be explained by Cheyne's definition of nervous disease as an "organic

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[1] Laurence J. Kirmayer, Robert Lemelson, & Mark Barad, "Introduction: Inscribing Trauma in Culture, Brain, and Body," in *Understanding Trauma: Integrating Biological, Clinical, and Cultural Perspectives*, eds. Laurence J. Kirmayer et al. (New York: Cambridge University Press, 2007), 4.
[2] Kirmayer, Lemelson, and Barad, "Introduction," 4.
[3] Ibid., 4.
[4] Paul Lerner & Mark S. Micale, "Trauma, Psychiatry, and History: A Conceptual and Historiographical Introduction," in *Traumatic Pasts: History, Psychiatry, and Trauma in the Modern Age, 1870-1930*, eds. Mark S. Micale & Paul Lerner. (Cambridge: Cambridge University Press, 2001), 10.
[5] Edward Shorter, *A History of Psychiatry: From the Era of the Asylum to the Age of Prozac*. (New York: John Wiley & Sons, Inc., 1997), 24.

illness over which the mind has no control."[6] His construct legitimated the condition and the experience of sufferers by positioning these within an established medical framework. In contrast, two hundred years after Cheyne, Karl and William Menninger treated similar patients, but classified their condition as psychiatric illness.[7] These two visions of mental illness—one rooted in the neurosciences that positions the origin of distress in the patient's neurobiology and the other that focuses on the psychosocial character of patient's lives, "attributing their symptoms to social problems or past personal stresses to which people may adjust imperfectly"—wax and wane throughout the history of psychiatry and indeed, the history of the stress concept.[8]

Organized psychological medicine, inspired by new discoveries about the nervous system and the establishment of the medical field of neurology, took up the concept in earnest in the 1870s. In this period, physicians further parsed the diagnostic categories that had described nervous ailments and attempted to map them onto specific causes. A widespread concern about the speed of travel prompted one such diagnostic: "individuals caught in railway accidents might suffer not only from physical injuries but also from a sort of physical shock to the nervous system that left them anxious and ill with 'railway spine'."[9] Accidents and personal injury claims related to rail travel in the nineteenth century positioned the popular diagnosis of railway spine in a medico-legal framework in which courts tried to distinguish compensation seekers from those who suffered from surgeon John Erichsen's diagnosis of "chronic inflammation of the spinal cord and its

[6] Ibid., 24-25.
[7] Ibid., 25.
[8] Ibid., 26.
[9] Kirmayer, Lemelson, and Barad, "Introduction," 4.

linings."[10] Though Erichsen's description could not be verified by pathologists, some courts decided to award damages for nervous shock. As historian Edward Brown argues, these formulations of traumatic neuroses as invisible to medical observation yet worthy of compensation, paved the way for the deployment of the diagnosis of shell shock to describe soldiers returning from WWI who were not physically injured but displayed neurological symptoms.[11] The diagnosis of shell shock in turn enhanced the acceptance of the premise that mental illness could be psychological in origin and involve unconscious motives.[12]

Psychoanalysis would become the dominant paradigm in American psychiatry from about 1940 to 1975. Its roots can be found in France where it appeared as a therapy for traumatic hysteria, a condition described by Jean Martin Charcot. Sigmund Freud, who briefly studied under Charcot in Paris, transformed Charcot's definition of traumatic hysteria, in which an actual event preceded observed signs and symptoms, to "conversion hysteria," in which a repressed wish resulted in paralysis or other signs and symptoms without an organic basis. At the same time, Parisian neurologist Pierre Janet, attempted to bridge the views of Charcot and Freud by relating hysteria and obsessive-compulsive disorder.[13] Interestingly, all of these physicians were neurologists trained in organic psychiatry who became interested in employing the psychotherapeutic technique of hypnosis.[14] Freud ultimately eschewed hypnosis as creating the complication of physician suggestion and he and his psychoanalytic followers began to analyze their

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[10] Edward M. Brown, "Between Cowardice and Insanity: Shell Shock and the Legitimation of the Neuroses in Great Britain," in *Science, Technology and the Military, Volume XII*, eds. Everett Mendelsohn, et al. (Dordrecht: Kluwer Academic Publishers, 1988), 328.
[11] Brown, "Between Cowardice and Insanity," 329.
[12] Ibid., 324.
[13] Lerner & Micale, *Trauma, Psychiatry, and History*, 14.
[14] Shorter, *A History of Psychiatry*, 137.

patients' thoughts, free associations, fantasies, and dreams. The expert analysis of these "texts" was evidence for the psychoanalytic claim that psychological problems "arose as a result of unconscious conflicts over long-past events," especially "repressed childhood sexual memories and fantasies reactivated [or converted to hysteria] in adult life." [15] By World War II, physicians charged with treating combat fatigue would employ the pervasive psychoanalytic methodology.[16]

According to historian Anne Harrington, Freud's interest in hysteria waned by the 1920s. However, some of his acolytes had begun to forge connections between apparently organic disorders such as asthma, headaches, and ulcers and psychoanalytic approaches. American psychosomatic medicine emerged in earnest in the 1920s and was both "funded by well-heeled foundations and sought alliances with physiologists [for] a place in the medical mainstream."[17] In 1939, psychoanalysts Helen Flanders Dunbar and Franz Alexander founded the journal of the American Psychosomatic Society, *Psychosomatic Medicine*.[18] A Hungarian émigré to the United States, Alexander would pioneer a merger between Freudian theory and empirical work on the physiology of emotions, in particular that of Walter B. Cannon who was constructing the "fight or flight" hypothesis at Harvard University.[19] Alexander would also differentiate between acute and chronic emotional strain by suggesting that "chronic repression of different specific emotions has the effect of chronically stimulating or activating different specific vegetative organs in one's body—the heart, the lungs, circulation, gut, and more—until

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[15] Ibid., 145-146.
[16] Shorter, *A History of Psychiatry*, 165.
[17] Anne Harrington, *The Cure Within: A History of Mind-Body Medicine*. (New York: W.W. Norton & Company, Inc., 2008), 27.
[18] Harrington, *The Cure Within*, 88.
[19] Ibid., 91.

they finally began to malfunction."[20] He identified bronchial asthma, peptic ulcer, ulcerative colitis, thyrotoxicosis, essential hypertension, rheumatoid arthritis, and neurodermatitis as disorders caused by "chronic excitation."[21] As one historian claims, Alexander "was not interested in colonizing all of medicine on behalf of Freud but simply wanted to claim a cluster of chronic diseases that mainstream medicine had long been unsuccessful in treating anyway."[22] Indeed at this time, medicine was ill-prepared to intervene in matters of non-communicable disease, though the primary causes of morbidity and mortality had shifted toward chronic conditions in the developed world.

During the interwar years of the twentieth century, criticism of the narrow scope of medicine coalesced into several other alternative movements that were similar to psychosomatic medicine, including constitutionalism, neo-Hippocratic medicine,[23] social medicine, homeopathy, and naturopathy among others.[24] These movements defined the causes of medical reductionism in various ways: as the unfortunate result of fragmentation of the medical profession into specialized, disconnected groups; the result of the separation of emotions and the psyche from the medical characterization of individuals; and the rise of a myopic interest in cure rather than disease prevention.[25] The holistic perspective was exemplified by the sociology of Émile Durkheim, a contemporary of Freud, who argued that society was like an organism, comprised of

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[20] Ibid., 91.
[21] Ibid., 91.
[22] Ibid., 92.
[23] Like the classical Greek system of constitutional typology which divided individuals into sanguine, choleric, melancholic, and phlegmatic temperaments, Neo-Hippocratic medicine classifies patients based on body size, endocrine function, metabolic rate, and "balance" of systems. For example, individual autonomic nervous system balance could be either sympathetic or parasympathetic dominant. Neo-Hippocratic interventions often include dietary changes; however, sweating, laxatives and purgatives, and bloodletting are also part of the clinical toolkit.
[24] Christopher Lawrence & George Weisz, "Medical Holism: The Context," in *Greater than the Parts: Holism in Biomedicine, 1920-1950*, ed. Christopher Lawrence & George Weisz (New York: Oxford University Press, 1998), 1.
[25] Lawrence &Weisz, *Medical Holism*, 2.

separate structures which functioned together to maintain social equilibrium. Durkheim focused his field on the study of "social facts" which influence the behavior of groups, rather than on psychology, or the interior motivations of individuals. His perspective was embraced in America, particularly by the so-called Chicago School of sociologists in the 1920s through the 1940s. Similarly, the paradigmatic shift away from universal history and the rejection of the biological reductionism of social Darwinists toward structural functionalism signaled the arrival of holistic sentiments in the field of anthropology.[26] Holism also appealed to the burgeoning public health sector, which especially in its early history saw its mandate limited by medical authority.[27] The expanded field of view of public health, encompassing entire populations and their physical and social environments, was emblematic of anti-reductionist sentiments. Notably, the use of social statistics in this field also linked it to Durkheimian sociological approaches. Among other contributions, the statistical method of inquiry revealed inequalities in health between populations. As Lawrence and Weisz explain, social forces enabled particular manipulations of these statistical tools: "a major impetus to population thinking has been the emergence of political ideologies emphasizing the centrality of such categories as race, nation, class, and gender."[28] For better or for worse, these social categories have influenced the way that public health has divided populations and measured their disease burden. On this foundation, public health researchers have more recently devised a handful of hypotheses, including the psychosocial stress hypothesis, to explain the statistical differential in well-being between social groups.

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[26] Ibid., 11.
[27] Paul Starr, *The Social Transformation of American Medicine: The Rise of a Sovereign Profession and the Making of a Vast Industry*. (New York: Basic Books, 1982), 181.
[28] Lawrence &Weisz, *Medical Holism*, 3.

While it has had markedly less attention than other subjects of medical historical inquiry, a few scholars have examined the concept of stress as a cultural phenomenon. Harrington frames stress as a concept that emerged from interwar laboratory science focused on understanding the breakdown of American soldiers and from post-war anxieties about the cost of prosperity on our emotional and physical well-being.[29] In her 2008 book, *The Cure Within: a History of Mind-Body Medicine*, Harrington "seeks to claim mind-body medicine for cultural history—to show how it functions as a far flung and omnivorous discourse that does not respect the boundaries we try to set up between the professional and the popular. . ."[30] She sees her subject as a patchwork of approaches, some of which emphasize our power to heal ourselves. Harrington situates stress within the larger framework of mind-body medicine, which she positions in opposition to physicalist medicine. She describes the latter as having conceptual, therapeutic and existential shortcomings that leave patients dissatisfied.[31] As she suggests, for patients who bring a "consumerist sensibility" to their medical care, particularly in the case of chronic conditions, insufficient or palliative rather than curative therapies can "produce a sense of helplessness, even betrayal"[32] The lack of clinical therapies for modern disease, Harrington imagines, is somewhat satisfied by the personal narratives provided by mind-body medicine.

Pediatrician and medical historian, Russell Viner claims that stress is absent from both expert and lay narratives before the 1930's and positions Hans Selye, the endocrinologist who discovered and named the General Adaptation Syndrome, as

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[29] Harrington, *The Cure Within*, 28.
[30] Ibid., 17.
[31] Ibid., 17.
[32] Ibid., 17.

someone who gave stress a scientific identity that subsequently allowed everyday hardships to be perceived as scientifically identifiable and controllable.[33] In Viner's history, Selye is portrayed as a self-promoter; he "believed himself to have discovered a universal truth regarding the relationships of organisms with their environment, a truth he would sell to whoever would listen."[34] Thus, as a result of Selye's "objectification" of stress theory and his attempts to assert proprietary rights over his discovery, Viner concludes that the concept of stress first found acceptance in the popular domain and only later in the scientific.[35] In this way, Viner contends that Selye himself is responsible for the movement of stress from what he terms a "suspect physiological research hypothesis in 1950" to "an incontrovertible 'truth' of modern life."[36]

Revealing his social constructionist perspective, Viner contends that physiologic stress research, specifically the Selye model of stress, was considered by his contemporaries to be subject to poor scientific method.[37] This claim is based largely on a 1971 review article in the *Journal of Psychiatric Research* by a contemporary of Selye, John W. Mason, in which Mason suggests that "[m]uch of the controversy over 'Stress' theory in the '50s was waged by argument rather than by experiment. Individual workers simply tended to assume personal stands more or less intuitively . . ."[38] However the remainder of the article explains how Selye's theories were later experimentally confirmed, several by Mason himself. Mason concluded that Selye's contribution *was* important, but disagreed with what he characterized as Selye's myopic focus on somatic

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[33] Russell Viner, "Putting Stress in Life: Hans Selyeand the Making of Stress Theory," *Social Studies of Science* 29(3) (June 1999), 405.
[34] Viner, "Putting Stress in Life," 394.
[35] Ibid., 394-5.
[36] Ibid., 399.
[37] Ibid., 404.
[38] John W. Mason, "A Re-Evaluation of the Concept of 'Non-Specificity' in Stress Theory." *Journal of Psychiatric Research*, 8 (August 1971), 323.

changes divorced from the activity of the mind. Mason felt the important work on stress reactions remained with emotional stressors: "There seems to be little doubt that the potency of psychological influences in the regulation of corticosteroid levels was almost universally underestimated by early workers in the 'stress' research field. In general, as perhaps indicated by Dr. Selye's use of the phrase, 'mere emotional stimuli . . .,' physiologists tended to regard psychological variables as negligible factors in their experiments by comparison with such obviously drastic physical variables as trauma, exercise, heat, fasting, and so on."[39] By taking neuroendocrinologist John W. Mason's critique of physiology to be an accurate statement about the quality of Selye's work, Viner conferred victory upon one disciplinary perspective within the stress debate of that period. Further, it is Viner's thesis that the *concept* of stress, manufactured by Selye, existed apart from his scientific work. Viner's conclusion that the concept became incorporated into "modern life narratives, despite the marginalization of [Selye's] scientific findings" in part because of the appeal of the possibility of a "controllable interaction between humans and their environment" is much too quick to dismiss Selye's contributions to science.[40]

In 1980, anthropologist Allan Young proposed a similar theory for the endurance of the stress concept by focusing his inquiry on the production of stress research in the domain of the social sciences. Young concluded that the social and behavioral science literature on stress had "an ideological quality" that inclined many readers to "feel that the stress argument [was] intuitively correct."[41] By examining the construction of scales

[39] Mason, " Re-Evaluation," 325.
[40] Viner, "Putting Stress in Life," 405.
[41] Allan Young, "The Discourse on Stress and the Reproduction of Conventional Knowledge," *Social Science & Medicine* 14B (1980), 133.

used to measure stressful life events, he concludes that the "theoretical knowledge and social relations that produce facts about stress simultaneously produce evidence that conventional (Western) beliefs about the social order are accurate descriptions of the universal social condition of humankind."[42] Thus, according to Young, the products of stress research are socially constructed to reflect dominant values about man's proper social nature. Young characterizes the literature correctly. Stress is understandably equated with both social and biological change, but perhaps less inevitable are the selection of hypothesized protective factors by the research community. Stress "buffers" like religiosity, civic participation, and traditional family values, may primarily be manifestations of the status quo.

At present, information on stress is widely available to lay audiences in mass circulation magazines, self-help books, television programs, lectures, and pharmaceutical advertisements.[43] It has become a ubiquitous reference in modern lay discussions of health and illness, has been assumed as a personal narrative, and wielded as an instrument of social critique. As Viner concludes, "[s]tress neither came to pervade modern life because it was 'true' in the sense of an accepted scientific fact, nor because it 'worked' in providing new therapies for human disease, but because it became 'true' in the arena of popular understanding of disease."[44] Harrington agrees. She sees mind-body medicine, and stress discourse within it, as a unique platform characterized by hybrid forms of self-help, alternative, and clinical medicine that is at the same time "a deeply storied world," guided by an impulse toward making personal sense of the suffering of illness in ways

[42] Young, "The Discourse on Stress," 136.
[43] Ibid., 133.
[44] Viner, "Putting Stress in Life," 405.

that express moral, religious, and existential meaning.[45] Harrington's approach recalls *The Gospel of Germs: Men, Women, and the Microbe in American Life*, in which historian Nancy Tomes formulated an American history of germ beliefs that spoke to the AIDS epidemic.[46] Tomes described the popular reception of germ theory as tied to American religiosity and characterized the "gospel of germs" as a form of health superstition that ultimately resolved in prejudice. Yet despite the emphasis by several of the above authors on stress as a manufactured concept, the observation that tacit beliefs shape the course of stress research is incorrectly aimed if it hopes to diminish its utility or validity. Though the hypotheses produced by stress researchers appear to resonate with dominant cultural ideologies across time, stress is not merely a narrative and scientific inquiry into the human response to it is not trivial. Recent examinations of the physiological and psychological outcomes of survivors of natural disasters, famines, genocide, and war exhibit enormous potential for treatment and more sophisticated understandings of human sensitivity, including the possibility of resiliency.

The present inquiry will not argue that stress is an abstract proposition, but rather will examine the historical contexts and intellectual moments that have produced our current understanding in an effort to show the outcome to be less than inevitable and create space for new analytical directions. Despite its origins as a description of localized physical trauma, across time stress expands to include stressors of an "everyday" nature, which among other factors enabled the connection of stress physiology to discussions about race. I will also trace changes to the connotation of stress from its original neutral formulation—any demand on the body that requires it to adapt—into its ubiquitous

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[45] Harrington, *The Cure Within*, 254.
[46] Nancy Tomes. *The Gospel of Germs: Men, Women, and the Microbe in American Life*. Cambridge: Harvard University Press, 1998.

negative character, a transformation that has facilitated the utilization of the stress physiology in matters of social and health policy.

Chapter I

The General Adaptation Syndrome

In his 2008 popular book, *Why Zebras Don't Get Ulcers: The Acclaimed Guide to Stress, Stress-Related Diseases, and Coping*, neuroendocrinologist Robert Sapolsky introduces Hans Selye as "one of the godfathers of stress physiology."[47] This account features Selye as a "young, unheard-of assistant professor" who was "lame at handling lab rats."[48] But in fact, Selye manages to appear as a noted member of the historical lineage in a number of contemporary portrayals of stress. A version of the story of Selye's discovery of the General Adaptation Syndrome is recounted in full in Bruce McEwen's 2002 book, *The End of Stress as We Know It*.[49] Though McEwen lamented the potential confusion between his own term, "allostatic load," and "stress," his work is an extension of Selye's original hypothesis: "Although some of us now regret Selye's choice of words, all of our current understanding of the connections between stress and health stems from his research."[50] Physician Gabor Maté dedicates his 2003 book, *When the Body Says No: Exploring the Stress-Disease Connection* to both his mother and "to the memory of Dr. Hans Selye, a twentieth century Renaissance man whose scientific

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[47] Robert Sapolsky, *Why Zebras Don't Get Ulcers: The Acclaimed Guide to Stress, Stress-Related Diseases, and Coping*. (New York: Henry Holt and Company, 2008), 7.
[48] Sapolsky, *Why Zebras Don't Get Ulcers*, 7.
[49] Bruce McEwen, *The End of Stress as We Know It*. (Washington, D.C.: Joseph Henry Press, 2002).
[50] McEwen, *The End of Stress*, 11.

insights and humane wisdom continue to illuminate."[51] Selye's views are written here as support for the physiological effects of emotions in a psychoanalytic frame. Selye's insistence that "stress is not simply nervous tension . . . stress reactions do occur in lower animals, and even plants, that have no nervous systems . . . indeed stress can be produced under deep anesthesia in patients who are unconscious, and even in cell cultures grown outside the body" is interpreted by Maté as evidence that the physiologic stress response can occur in people "who are in the grip of unconscious emotions."[52] Thus, Selye's work on the basic science of trauma has been carried forward as a kind of historical and scientific authority for a variety of recently hypothesized links between stress and disease.

Selye was beginning his work in the emerging field of endocrinology, the study of hormonal communication in the body, in the 1930s.[53] As Shorter and Fink describe in a recent book, the discipline of endocrinology was initially founded upon discoveries from experimentation with organ transplantation. In 1849, Arnold Adolph Berthold of the University of Göttingen, Germany had demonstrated that transplanting a rooster's testes to another part of its body prevented atrophy of the comb, which was typically a consequence of castration.[54] French physiologist Claude Bernard described the concept of internal secretion in 1854 and hypothesized that this process somehow contributed to the maintenance of an organism's internal environment.[55] Bernard, then professor of medicine at the Collège de France in Paris, is credited with the establishment of the

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[51] Gabor Mate, *When the Body Says No: Exploring the Stress Disease Connection*. (Hoboken: John Wiley & Sons, Inc., 2003), 28.
[52] Gabor Mate, *When the Body Says No,* 28.
[53] Sapolsky, *Why Zebras Don't Get Ulcers*, 7.
[54] Edward Shorter and Max Fink, *Endocrine Psychiatry: Solving the Riddle of Melancholia*. (New York: Oxford University Press, Inc., 2010), 16.
[55] Elizabeth Watkins, *The Estrogen Elixir: A History of Hormone Replacement Therapy in America*. (Baltimore: Johns Hopkins University Press, 2007).

discipline of experimental physiology. Most notably, he asserted that the constancy of the internal environment (*milieu intérieur*) was a precondition for independent life.[56] By 1905, researchers had identified ovarian secretions and the discharges of a few other endocrine glands. Ernst Starling had discovered secretin, a substance released by cells of the intestine to stimulate the pancreas to release digestive juices, and had called it a hormone, which meant "to excite or arouse" in Greek.[57] The study of reproductive endocrinology was solidified by 1910 and could claim the discovery of estrogen, progesterone, and testosterone as well as the gonadotrophins, the pituitary hormones that control the sex hormones.[58] In 1921, Frederick Grant Banting and Charles Herbert Best discovered insulin at the University of Toronto, which proved to be a life saving therapy for diabetics.[59] As historian Elizabeth Watkins describes in her 2007 book, insulin had obvious clinical value, but many other hormones were also made into pharmaceutical preparations and used for "rejuvenation therapies."[60] For example, Ayerst, McKenna, and Harrison, a Canadian firm, entered the American market with Emmenin, an estrogen product obtained from placentas that had been isolated and developed by James Bertram Collip at McGill University in 1930.[61] Hans Selye would begin to work in Collip's lab at McGill in 1936.

A widespread interest in the stability of bodily systems had sprung from Claude Bernard's assertions that an organism's *milieu intérieur* must remain constant, despite changes in its external environment.[62] American physiologist, Walter Cannon, built on

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[56] Shorter & Fink, *Endocrine Psychiatry*, 16-17.
[57] Watkins, *The Estrogen Elixir*, 13.
[58] Ibid., 30.
[59] Ibid., 16.
[60] Ibid., 16.
[61] Ibid., 21.
[62] Hans Selye, *Stress without Distress*. (New York: The New American Library, Inc.,1975), 22.

this work and described *homeostasis* in the 1930s, or the coordinated physiological processes that maintained the steady state of the organism. Cannon began his laboratory work studying peristalsis, or the intestinal movements associated with digestion, and noticed that this activity was inhibited in his experimental animals when they were distressed.[63] After looking into this phenomenon further, Cannon would find that the blood of frightened animals contained a hormone he called adrenin, which was secreted by the adrenal gland located on the kidney. Beyond this, Cannon would also identify a suite of physiological changes including an increase in blood pressure and blood sugar levels, dilation of the pupils, piloerection, and inhibition of digestion associated with emotional excitation in his animals.[64] Cannon adopted an evolutionary perspective to explain these state changes, by suggesting that the observed characteristics would have evolved to help the animal to either fight or flee from his enemy. In the wild, Cannon hypothesized, the animal could mobilize these resources temporarily and then return to its previous state.[65]

Cannon applied his findings to social theory with the claim that the fast-paced uncertainty of the modern era would cause many people to chronically stimulate their emergency responses with few opportunities to restore homeostasis, thus increasing illness. According to Cannon, if emotional excitement is triggered, "but is there is no war to be waged, if the emotion has its naturally mobilizing effects on the viscera when there is nothing to be done, obviously the very system which functions to preserve constancy of conditions within us is then employed to upset that constancy. It is not surprising, therefore, that fear and worry and hate can lead to harmful and profoundly disturbing

[63] Harrington, *The Cure Within*, 145.
[64] Ibid., 146.
[65] Ibid., 146-147.

consequences."[66] Like modern proponents of evolutionary medicine, Cannon perceived a "mismatch" between evolved human biology and life in the 1930s.

While rarely mentioned by name in modern accounts, the General Adaptation Syndrome, discovered and named by Hans Selye, organizes his observations of a stereotyped reaction to physical trauma in animal models. Selye emphasized the nonspecific character of this reaction throughout his life, as he aimed to describe the human body's response to challenge *in general*—a syndrome that could be associated with a range of agents and experiences. In some ways, his scientific process resembled the experimental protocol of serum and inoculation therapy during initial inquiries into the nature of the human immune defense. Like these nineteenth century observations about immunity, Selye sought to expose an organism to a variety of agents and in this trial and error manner, to characterize the physiological responses that were alike across challenges. Selye's work differs from Cannon's in that it initially lacked an emotional component; however, there is evidence to suggest that late in his life, he did accept psychoanalytic definitions of stress. In the 1976 edition of *The Stress of Life*, he included a chapter titled "Psychosomatic Implications."[67] Here he agrees that unconscious conflicts can cause physical disease: "Our failure to adjust ourselves correctly to life situations is at the very root of the disease producing conflicts. Psychoanalysis cures because it helps us to adapt ourselves to what has happened."[68] Selye appears to have come to this belief by analogy, however—just as the immune system puts up a barricade of inflamed tissue, the mind constructs emotional defensive responses.[69]

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[66] Ibid., 147.
[67] Hans Selye, *The Stress of Life*. (New York: McGraw-Hill Book Co., 1976), 405.
[68] Selye, *The Stress of Life*, 406.
[69] Ibid., 408.

This chapter describes the General Adaptation Syndrome and examines several accounts of Selye's scientific practice, especially the portrayal found in his own writings. Like Cannon, Selye adapted his laboratory findings into a personal philosophy and published it in popular works, such as *From Dream to Discovery: On Being a Scientist* (1964), *Stress without Distress* (1975), *The Stress of Life: A Scientist's Memoirs* (1976), and *The Stress of My Life* (1979), among other texts. Perhaps the social philosophizing undertaken by Selye inspired the cooptation of his research by sociologists who would eventually build upon his initial links between stress research and social theory. In fact, links between the disciplines of sociology and physiology would become quite formalized around stress research. As anthropologist Allan Young proposes, "[m]any sociologists operate as if the endocrinological discourse were an authority for their stress research." The authority of biomedicine "naturalizes" the theoretical knowledge of empiricist sociology or, rather, gives it the appearance of simply reflecting the facts of nature. Young describes the "empiricist" tradition in sociology, tracing its roots to Durkheim, as reliant on a claim that scientific knowledge of social behavior is possible because we possess a value-free language of observation and description. In this framework, science merely uncovers facts that already exist and produces knowledge that is not predetermined by circumstances outside of it.[70] However, as the present inquiry will illustrate, the engine of change in our understanding of stress lies entirely in the circumstances that determine its application, which have often been the result of negotiations between disciplinary actors.

[70] Young, "The Discourse on Stress," 136-137.

Discovery

In a July 4, 1936 letter to the editor of *Nature*, Hans Selye introduced the General Adaptation Syndrome (G.A.S), a three-stage syndrome in response to acute physical injury. The syndrome was "general," in that the same three symptomatic stages—alarm reaction, resiliency, and then exhaustion or relapse—could be produced irrespective of the type of injury or injected agent that Selye administered to animals in his lab. In fact, the reaction appeared in rats after exposure to cold, surgical injury, transcision of the spinal cord, excessive muscular exercise, as well as after doses of adrenaline, atropine, morphine and formaldehyde.[71]

In several accounts, Selye was injecting rats with an extract of bovine ovary in the Department of Endocrinology at the University of Montreal when he discovered the General Adaptation Syndrome. In Sapolsky's version of this story, "Selye would try to inject the rats, miss them, drop them, spend half the morning chasing the rats around the room or vice versa, flailing with a broom to get them out from behind the sink, and so on. At the end of a number of months of this, Selye examined the rats and discovered something extraordinary: the rats had peptic ulcers, greatly enlarged adrenal glands (the source of two important stress hormones), and shrunken immune tissues . . . Being a good scientist, he ran a control group: rats injected daily with saline alone, instead of the ovarian extract. And, thus, every day they too were injected, dropped, chased, and chased back. At the end, lo and behold, the control rats had the same peptic ulcers, enlarged adrenal glands, and atrophy of tissues of the immune system."[72] In Harrington's version, Selye's rats suffer a similar ordeal, though here it is the scientist's intention to

[71] Hans Selye, "A syndrome produced by diverse nocuous agents," *Nature* 138(2) (July 4, 1936): 32.
[72] Sapolsky, *Why Zebras Don't Get Ulcers*, 8.

inflict it. She positions Selye in her chronological timeline after a discussion of Walter Cannon's work on the physiological basis of strong emotional experiences.[73] With this frame, Selye's syndrome appears to involve emotion and becomes something more akin to psychological trauma. As she describes the discovery, ". . . perhaps what the rats were exhibiting was not a specific response to a specific agent but a nonspecific response to the trauma of having a noxious (and probably impure) agent injected into their bodies." Harrington catalogs the experiments with a subtext of improper medical experimentation: "Some were put on the roof of the medical building in the winter; some were put down in the heat of the boiler room; some underwent an operation in which their eyelids were sewn back and they were then exposed to brilliant lights; some were placed inside barrel-like, revolving treadmills powered by an electric motor that forced them into a state of complete exhaustion."[74] It is interesting that both of these recent popular accounts of his discovery, Selye is represented as incompetent or cruel and stress is likened to torture.

For his part, Selye compared his explorations to then known non-specific treatments such as fever therapy, shock therapy, and bloodletting and was particularly interested in cataloging the defensive response of the organism: "By clarifying the function of the mechanism of response through which Nature herself fights injuries of various kinds, we might learn how to improve upon this reaction whenever it is imperfect."[75] In his autobiography, Selye describes himself as a young assistant in the Biochemistry Department at McGill University when he discovered and characterized the General Adaptation Syndrome.[76] These experiments convinced Selye to alter his

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[73] Harrington, *The Cure Within*, 148.
[74] Ibid., 149.
[75] Selye, *The Stress of Life*, 31.
[76] Ibid., 21.

scientific focus from sex hormones to cataloging more nuanced observations of the trauma-related changes in his animals. According to Selye, his initial inquiry into the G.A.S. was to determine the scientific basis of the "syndrome of just being sick" or the signs and symptoms in common across many diverse diseases.[77] The "syndrome of just being sick" was characterized by enlargement and hyperactivity of the adrenal cortex, shrinkage of the thymus gland and lymph nodes, and the appearance of gastrointestinal ulcers.[78] Selye evidently felt challenged by reductionist medical models as he emphasized in many publications that the effects of his syndrome were not localized to one organ or bodily system, but rather were produced by a variety of causes, and appeared depending upon individual attributes of vulnerability or resiliency. He had remarked as a medical student that "so few signs and symptoms were actually characteristic of any one disease. Most of the disturbances were apparently common to many, or perhaps even all diseases."[79] Thus, at least in the retrospective setting of his autobiography, Selye's inquiry fit the aims of medical holists who were looking to expand upon the etiological hypotheses offered by bacteriology. However, Selye does not appear to have engaged in an active critique of medical practice or to have overtly championed alternative movements.

The Meaning of "Stress"

As in many other realms in which naming functions to confer social status, the field of stress research has had more than its share of neologisms. Neuroscientist Robert Sapolsky's version of the history suggests that Selye did not invent the term: "Legend has

[77] Selye, *Stress without Distress*, 24.
[78] Ibid., 24-25.
[79] Hans Selye, *The Stress of Life*, 17.

it (mostly promulgated by Selye himself), that Selye was the person who, searching for a way to describe the nonspecificity of the unpleasantness to which [his] rats were responding, borrowed a term from physics and proclaimed that the rats were undergoing 'stress.' In fact, by the 1920s the term had already been introduced to medicine in roughly the sense we understand it today by a physiologist named Walter Cannon."[80] Anne Harrington notes that Selye "took the word from metallurgy, but it was, in fact, somewhat misapplied since in the world of engineering 'stress' referred to the forces that act to deform or weaken metals; it did not refer to the resulting condition of the metals themselves."[81] By 2002, Bruce McEwen would expand the term to include the social environment and emotional reactions by defining stress as "the pressure that life exerts on us and to the way this pressure makes us feel."[82] As these definitions illustrate, constructing a lineage for stress relies upon one's willingness to combine disparate things into the same category.

Selye's definition identifies physiological stress as a response to *any* type of demand made on the body.[83] In other words, stressors, or stress producing factors, are vastly different, but they elicit essentially the same biological stress response.[84] Unlike contemporary uses of the term, Selye conceptualized stressors as both those that produce bad effects that should be avoided and those that enable us to enjoy the pleasures of accomplishment. Stressors simply create demands on the system to readjust, and thus "produce a nonspecific increase in the need to perform adaptive functions and thereby to

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[80] Sapolsky, *Why Zebras Don't Get Ulcers*, 8.
[81] Harrington, *The Cure Within*, 150.
[82] McEwen, *The End of Stress*, 3.
[83] Selye, *Stress without Distress*, 2.
[84] Ibid., 13.

re-establish normalcy."[85] This demand for readjustment is produced ". . . whether the agent or situation we face is pleasant or unpleasant. . ."[86] For Selye, considerable stress might be produced by "any kind of normal activity—a game of chess or even a passionate embrace" without causing harmful effects.[87] In fact, he gave the response to negative stressors a different name: "Damaging or unpleasant stress is *distress*."[88] In this framework, stress and stressors were not isolated from context and their effects could manifest differently across individuals. According to *Stress without Distress*, the "stressor effect depends merely on the intensity of the demand made upon the adaptive capacity of the body."[89] To Selye, experiencing stress was a normal and natural character of life; in fact, he concluded that "complete absence from stress is death."[90] By this theory, the psychological stress level is lowest during indifference, but never is as low as zero—"deprivation of stimuli and excessive stimulation are both accompanied by an increase in stress, sometimes to the point of distress."[91]

Selye described "alarm signals" sent out by stressed tissues to the coordinating centers of the nervous system which trigger the pituitary and the adrenals to "produce adaptive hormones, to combat wear and tear in the body."[92] Thus stress hormones facilitated adaptation by functioning as anti-inflammatory forces to inhibit excessive defensive reactions.[93] Selye termed glucocorticoid hormones—ACTH, cortisone, and cortisol—"syntoxic" because "they facilitate coexistence with a pathogen, either by

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[85] Ibid., 15.
[86] Ibid., 15.
[87] Ibid., 18.
[88] Ibid., 18.
[89] Ibid., 18.
[90] Ibid., 20.
[91] Ibid., 21.
[92] Selye, *The Stress of Life*, 55.
[93] Ibid., 55, 56.

diminishing a sensitivity to it or encapsulating it within a barricade of inflammatory tissue."[94] As evolutionary biologists have pointed out, an immune response is always accompanied by a degree of damage. Consequently, the more adaptive response is for the immune system to rest when a response is unnecessary. Indeed, this view of stress hormones as positive forces serving to constrain the immune reaction is quite compelling. Synthetic glucocorticoids have been used in the treatment of asthma and autoimmune disease or in the care of minor skin irritations. Despite the "syntoxic" nature of cortisol as described by Selye, its presence in the circulation of an organism under negative forms of stress in experimental or natural conditions has led researchers to utilize this hormone as a biomarker to detect an adverse reaction to stimuli. In contemporary models, prolonged maintenance of high cortisol levels results in disease. However, in Selye's view, diseases of adaptation, or stress-related diseases, result only from derailments of the G.A.S. mechanism.[95]

By 1975, Selye asserted that stress played some role in the development of every disease, but that it "may be curative (as in the case of various forms of shock therapy, physical therapy, occupational therapy) or damaging, depending on whether the biochemical reactions characteristic of stress (for example, stress hormones or nervous reactions to stress) combat or accentuate the trouble."[96] According to Selye, stress plays a particular role in high blood pressure, cardiac accidents, gastric or duodenal ulcers, and mental disturbances.[97] However, his research convinced him that these common diseases are "largely due to errors in our adaptive response to stress, rather than to direct damage

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[94] Ibid., 56.
[95] Ibid., 56.
[96] Selye, *Stress without Distress*, 35.
[97] Ibid., 36-37.

by germs, poisons, or life experiences."[98]

Thus, rather than a psychogenic etiology or the immediate result of damage by an external stimulus, Selye's conception of diseases of adaptation can be viewed as similar to modern autoimmune diseases: "There is an element of adaptation in every disease; but, in some maladies, the direct effects of the disease producers, in others the body's own defensive reactions, are more prominent. Only in the latter case do we commonly speak of *diseases of adaptation*."[99] Interestingly, adaptation as defined by Selye is a "balanced blend of defense and submission" and he described the cause of several diseases as excessive or insufficient corticoid production including "high blood pressure, diseases of the heart and of the blood vessels, diseases of the kidney, eclampsia, rheumatic and rheumatoid arthritis, inflammatory diseases of the skin and eyes, infections, allergic and hypersensitivity diseases, nervous and mental diseases, sexual derangements, digestive diseases, metabolic diseases, cancer, and diseases of resistance in general."[100]

Selye contended that avoiding diseases of adaptation such as a heart attack or a nervous breakdown can be accomplished by self-monitoring and he included a checklist in his 1976 popular book, *The Stress of Life*. The list is comprised of thirty-one self-observable signs of stress such as general irritability, hyperexcitation, or depression; pounding of the heart; dryness of the throat and mouth; impulsive behavior and emotional instability; inability to concentrate; feelings of unreality, weakness or dizziness; fatigue; "floating anxiety" or fear without object; emotional tension or alertness; trembling or nervous ticks; tendency to be easily startled; high-pitched, nervous laughter; stuttering and other speech difficulties; grinding of the teeth; insomnia; hypermotility; sweating;

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[98] Selye, *The Stress of Life*, xvii.
[99] Selye, *Stress without Distress*, 169.
[100] Ibid., 170.

frequent need to urinate and several others.[101] However, Selye emphasized that the home detection of these symptoms should be impetus for consultation with a physician; he did not promote the alternative medical treatments such as mindfulness meditation, though this approach would later be linked to his research.

Selye's discovery has also been of interest to gerontology. The inevitable exhaustion phase of the G.A.S indicated to Selye that the body's adaptability or "adaptation energy" is finite. The length of the second phase of the G.A.S., resistance, according to Selye, is dependent upon both the intensity of the stressor and the subject's innate adaptability and he was initially puzzled because resistance could never go on indefinitely, even though normal food intake commenced during this period and thus energy was available for adaptation. He concluded that "just as any inanimate machine gradually wears out, even if it has enough fuel, so does the human machine sooner or later become the victim of constant wear and tear."[102] As Selye describes it, "[o]ur reserves of adaptation energy could be compared to an inherited fortune from which we can make withdrawals; but there is no proof that we can also make additional deposits."[103] Thus, a finite amount of adaptation energy is inherited and used across the lifespan, and ". . . every biological activity leaves some irreversible chemical scars."[104] The phenomenon Selye was referring to was apparently normal aging; however, his theories would be adapted later to describe premature aging among populations under chronic social stress. Evidence for the contemporary theory has been the detection of shortened telomeres, or regions comprised of repetitive DNA sequences at the end of a

[101] Ibid., 174-176.
[102] Ibid., 26.
[103] Ibid., 28.
[104] Ibid., 28.

chromosome which shorten at each replication, which thus can act as a clock to determine a subject's "biological age." McEwen's phrase "allostatic load," describing a "cumulative multi-system view of the physiological toll that may be exacted on the body through attempts at adaptation," would also be applied to inquiries into successful aging by social epidemiologist, Teresa E. Seeman.[105]

More than two decades after Selye's death, stress-related conditions named by McEwen include heart attacks, atherosclerosis, colds and infections, allergies, asthma, autoimmune conditions, diabetes, colitis, chronic fatigue syndrome, fibromyalgia, eczema, ulcers, and depression or anxiety—"there is even evidence that depression and traumatic stress can cause parts of the brain to atrophy."[106] Yet despite the appearance of a continuous lineage, Selye's characterization of negative impacts of stress as resulting from dysfunction of evolved mechanisms is changed in modern usage. More recent associations between stress and chronic disease describe "repeated" activation of the endocrinological stress mechanism as a cause of disease and imply that we should limit stimulation of this system if possible. It is clear that Selye's description of the physiological stress response as a neutral and normal function or as a protective defense has been altered.

McEwen calls on the authority of the *Oxford English Dictionary* in his 2002 book to explain that stress and distress were once used to describe the same thing, ". . . the word *stress* is simply a shortened form of *distress*, and in Middle English, *destresse* and

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[105] Teresa E. Seeman, Burton H. Singer, John W. Rowe, Ralph I. Horwitz, Bruce S. McEwen, "The Price of Adaptation—Allostatic Load and Its Health Consequences," *Archives of Internal Medicine*, 157 (1997), 2259-2268.
[106] McEwen, *The End of Stress*, 3-4.

stresse were used interchangeably."[107] This move may explain the insistence on a negative connotation for stress in recent social science research, much of which cites McEwen's work as foundational. The portrayal of social stressors as cumulative, negative influences on physiology is more easily adapted for use in sociologically informed health disparities discourse; however, Selye's formulations may still have some modern utility. At the very least, his work reminds us to look at the activity of stress hormones in nuanced ways.

"Egoistic Altruism"

The application of basic formulations of Selye's work was widespread among practitioners of alternative medicine who aimed to promote meditation and Eastern philosophy in the 1960's.[108] This phenomenon is worth noting because of the contemporary popularity of meditation as a therapy for stress and chronic inflammation. While still "alternative" in that many contemporary proponents appear to take a position against multi-national pharmaceutical interests, today meditation and other alternative treatments are subject to scientific investigation. In recent years, researchers have attempted to quantify and explain the healing effect of meditation, smiling, and prayer using fMRI imaging technology and randomized controlled trials.

The initial link between physiologic stress research and meditation was perhaps facilitated by both the holistic elements of Selye's syndrome and by his own popular writings. Selye believed that the natural laws that he observed in the laboratory could be translated into a philosophy of self-governance. As he explained this position, "[i]t has

[107] Ibid., 3.
[108] Viner, "Putting Stress in Life," 402.

seemed to me that the rules which act so efficiently at the level of cells and organs could also be the source of a natural philosophy of life, leading to a code of behavior based on scientific principles, rather than on superstition, tradition, or blind subservience to the commands of any 'unquestionable authority.'"[109] Selye constructed his "scientific philosophy of conduct—a rational prophylactic and therapeutic science of human behavior" on the basis of his observation as a WWI Austro-Hungarian émigré that the laws of society can be broken, but laws of nature cannot.[110] Thus his code of behavior aimed to be "both compatible with and independent of any religion, political system, or philosophy."[111]

Russell Viner has proposed that Selye believed stress science could prevent "destructive, revolutionary" social activity.[112] According to Viner, "[i]n Selye's message, conservative America and industry saw validation of their cherished beliefs in personal ambition and capitalist social relations. . ."[113] He reports that Selye's stress concept validated American capitalist social relations that "mandated work as a 'biological necessity.'"[114] He argued that "stress theory justified the position of the worker in capitalist society, and promised a means to deflect revolutionary and destructive tendencies into useful, natural worker activity."[115] Viner's view is based on Selye's apparent rejection of the concept of universal altruism, a belief that the human species is essentially cooperative, and support of a more individualistic perspective that endorsed in Selye's words "work[ing] for treasures that can be stored to ensure our future

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[109] Selye, *Stress without Distress*, 2.
[110] Ibid., 13.
[111] Ibid., 3.
[112] Ibid., 398.
[113] Viner, "Putting Stress in Life," 400-401.
[114] Ibid., 401.
[115] Ibid., 401.

homeostasis."[116]

It is true that Selye believed the fruits of work could be accumulated to ensure future biological stability, but in the sense that the work might be used to earn the goodwill, gratitude, respect and love of fellow men: "Then, even if he has neither money nor power to command, he will still become virtually unassailable and safe, for no one would have a personal reason to attack him"[117] This concept, Selye's "philosophy of gratitude," was particularly popular among his contemporaries. Its basic tenets were likely formed in relation to his experience as a displaced person fitted into a foreign culture. Selye describes the public interest in his philosophy in *Stress without Distress*: "much to my surprise, these rather subjective digressions from stress as a medical problem have raised a disproportionate amount of interest among psychologists, sociologists, anthropologists, and even clergymen of different faiths. I have received as much mail about the philosophy of gratitude as about any of the more tangible medical subjects discussed in *The Stress of Life*."[118] Though he had never spoken on anything but medical subjects, he was "asked to elaborate these ideas in churches and synagogues, and at conventions of such diverse groups as the Young President's Clubs, the Million Dollar Round Table, and Maharishi Mahesh Yogi's International Meditation Society."[119] Thus, the philosophy of gratitude was a particular component of Selye's oeuvre that may have bridged his scientific work and alternative medicine.

Though Selye believed that "all living beings must protect their own interests first of all," he also thought that altruism and thus a collective society was possible in a

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[116] Ibid., 401.
[117] Selye, *Stress without Distress*, 6.
[118] Ibid., 7.
[119] Ibid., 7.

modified form which he described as "a kind of collective selfishness that helps the community in that it engenders gratitude."[120] Selye concluded that biological homeostasis could be assured by inducing gratitude in others. In this framework, contributions to society entice others to share our wish for our own wellbeing.[121] Selye believed that egoistic altruism could ensure the "mutually satisfactory peaceful cooperation between competitive cells, organs, people, and even entire societies."[122]

The primary cause of stress-related disease according to Selye in 1975 was relations between men: ". . . each of us has his own ambitions and requirements, which often clash and become the major source of interpersonal stress. Naturally, the best solution to this problem would be perfect teamwork and mutual understanding, but, despite all of the codes of conduct offered by various religions, philosophies, and political systems, interpersonal relations remain very unsatisfactory. The stress of living with one another still represents one of the greatest causes of distress."[123] Selye constructed the natural state of social relationships as primarily adversarial. He described three options for "interpersonal defense reactions" based on his observation of adaptive and defensive reactions at a cellular level within organisms which he felt were useful analogies for interactions between people or groups. These were: "(1) the syntoxic, which ignores the enemy and tries to put up with him without trying to attack him; (2) the catatoxic, which results in a fight; and (3) flight, an attempt to escape."[124] Though his definitions might not be exactly the same, it is possible that Selye's wish to change the nature of interpersonal interaction enabled his scientific work to be linked to social

[120] Ibid., 53.
[121] Ibid., 54.
[122] Ibid., 54-55.
[123] Ibid., 61.
[124] Ibid., 43.

science hypotheses about social cohesion and support as protections against the negative impacts of stress.

Selye subscribed to the notion of internal balance advanced by Bernard and Cannon: "In order to maintain a healthy life, nothing within me must be allowed to deviate far from the norm. If anything does, I will become sick or even die."[125] By analogy, Russel Viner viewed Selye as anti-revolutionary. As Selye explained in *The Stress of My Life*, "I believe that the changes in our value system have done a great deal of harm to social relationships in many enterprises because they tend to encourage continuous insistence on one's own rights. This leads to our drawing up battle lines between management and workers . . ."[126] Selye's observations here appear to be less inspired by his value system than by his own experience, in particular as he explains, by his role as the coordinator of his lab.[127] Still, the notion of individual rights appeared to be contrary to the views Selye expressed in the philosophy of gratitude in which he places significant emphasis on social responsibility and problematizes personal ambition. This observation is not to characterize Selye as a radical, however. As he declared in a 1975 book with a comment by Alvin Toffler, author of *Future Shock* (1970), on the cover, "technological advances in our rapidly changing world are making more and more special demands on our abilities for re-adaptation. Now, through the media in our homes, we are facing daily new and often threatening events wherever they occur on earth (Vietnam, Watergate, the Middle East) or even in outer space . . . The now almost instantaneous dissemination of disquieting news and revolutionary new ideas permeates every part of society so that a reliable code of behavior and unchanging ideal to lean upon

[125] Ibid., 23.
[126] Selye, *The Stress of My Life*, 169.
[127] Ibid., 169.

for support become more and more difficult to formulate."[128] Employing his method of biological analogy, Selye clearly valued stability and constancy in society.

Selye's intended or unintended alliance with alternative practitioners and psychosomatic medicine would flatten many of the distinctive features of his scientific work into popular taglines. However importantly, Selye's basic science contribution to the stress/disease hypothesis would ultimately lay the groundwork for a variety of hypotheses on the biological embodiment of social phenomena. That his legacy lacks the clear assertion of his definition of stress creates the conditions for each successive wave of inquiry to support its views using his research as a foundation and thus a source of historical and scientific power. That future inquiries differ markedly and branch in different directions across time—some casting stress as emotional and psychological and others connecting stress to environment and modernization—is evidence of the strength of disciplinary perspectives and the impact of changing social values on the nature of stress inquiry. Like the connection made by Selye, biological homeostasis and social stability were particularly entangled at mid-century in America as analysts tried to explain why rates of cardiovascular disease appeared to be increasing at an alarming pace.

Chapter II

Civilization and Disease

A 1948 *Scientific American* article introduced a rise in hypertension and arteriosclerosis as an effect produced by modernization. Could this increase in "blood

[128] Selye, *Stress without Distress*, 8.

vessel diseases," physician Irvine H. Page asked, "be the new scourge of an aging population or is there something particular about contemporary society that can explain these effects?"[129] He continued to speculate: "Is it possible that the faster tempo and increasing frustrations of contemporary living may indeed foreshadow a greater incidence of hypertension independent of age?"[130] Thus in this 1948 article, hypertension is proposed to have both a psychogenic origin and to be caused by the "failure of the mechanism of adaptation to respond properly to the unfavorable environment in which most men find themselves"[131] Though many characteristics of society have changed and not necessarily in one direction, etiological hypotheses for coronary artery disease in relation to modernization persist today. This is compelling since the rate of death from this cause has declined while we ostensibly become more modern and commentators generally assume that stress has increased.

Changes in disease incidence have been linked with the modernization of lifestyles throughout human history. As an illustrative example by medical historian Mark Jackson in *Allergy: The History of a Modern Malady*, the metaphorical use of allergic diseases to express the perils of modern society can be traced as far back as the 18th century. William Cullen's (1710-90), *Practice of Physic*, which has been called the culminating treatise of Enlightenment medicine, served to consolidate the "systematic, nosological approach based primarily on symptoms" that was characteristic of the period.[132] Cullen divided diseases into four categories—fevers, wasting diseases, neuroses, and local diseases—and was particularly interested in the manner in which

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[129] Irvine H. Page, "High Blood Pressure," *Scientific American* (1948), 44.
[130] Page, "High Blood Pressure," 44.
[131] Ibid., 46.
[132] Mark Jackson, *Allergy: The History of a Modern Malady*. (London: Reaktion Books LTD, 2006), 73.

disorders of the nervous system played a central role in disease causation.[133] His preoccupation with the nervous system was linked to wider Enlightenment anxieties about the impact of modern civilization on health; "Echoing the earlier fears of George Cheyne (1671-1743), who had regarded asthma as one of a range of modern 'nervous distempers' . . . which were induced by overindulgence and inactivity, Cullen explained the apparent rise of chronic nervous diseases in terms of the greater sensibility of Western civilized nations, wrought partly by constitutional factors such as race, class, and gender, and age, and partly by luxurious, sedentary, and intemperate lifestyles."[134]

Cullen's views were extended in a 1786 treatise by Thomas Withers. Withers attributed the cause of increased asthma to the perils of modern living: "The greater irritability and weakness in the constitution these days, may, in some measure, account for the greater frequency of the Asthma, especially if we add the inventive genius, and the rapid progress of mankind in all the various arts of modern luxury and refinement."[135] Withers proposed that the chief cause of this acquired irritability is "artificial external heat, accumulated about the body by means of fires, clothing, and houses" which left one susceptible to changes in temperature. Lower class occupations such as cooks, bakers, blacksmiths and brewers were also subject to asthma. However, those considered most at risk were patients in the "'middling as in the higher stations of life,' who possessed the 'greatest delicacy of constitution'."[136] Asthmatic, Henry Hyde Salter (1823-71) also promoted a nervous theory of asthma. Like Hippocrates before him, Salter recognized that asthma could be precipitated by a multitude of factors such as diet, fatigue, and

[133] Jackson, *Allergy*, 73.
[134] Ibid., 73.
[135] Ibid., 76.
[136] Ibid., 78.

emotions. He also indicated "the greater pressures of modern civilization, particularly in relation to the class distribution of asthma: 'the rich might be really more liable to asthma than the poor, from a more irritable nervous organization engendered by the state of hyper-civilization in which we live.'"[137] Likewise, Sir Andrew Clark (1826-93), Emeritus Professor of Clinical Medicine at London Hospital, and George Beard, the American physician associated with the diagnosis and treatment of neurasthenia and hypochondria, also portrayed asthma as "the product of a 'nervous constitution' exposed to the 'complex influences of over-civilization.'"[138] For Beard, "hay fever was 'essentially a neurosis' generated, like neurasthenia, by the diverse pernicious features of modern life: novel modes of transport and communication; the range of 'unrhythmical, unmelodious' noises accompanying modern industrialization; an increase in the amount of business and the pace of discovery; climate change; domestic and financial troubles; the increased education and mental activity of women; and even greater liberty."[139]

These eighteenth and nineteenth century connections between modernized lifestyles and the incidence of disease prefigure recent scientific inquiry, for example in iterations of David Strachan's hygiene hypothesis.[140] The hygiene hypothesis, which implicates a lack of early childhood exposure to infectious agents in increased susceptibility to disease, is regularly cited to explain changes in epidemiological patterns. Proponents of the hypothesis describe cleaner environments, new hygienic practices, and reduced childhood infections since the industrialization of developed nations. Some observers have also cited increases in immunological disorders concurrent with the rising

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[137] Ibid., 93.
[138] Ibid., 59.
[139] Ibid., 59.
[140] David P. Strachan, "Family size, infection and atopy: the first decade of the 'hygiene hypothesis'," *Thorax*, 55(Suppl 1) (2000), S2–S10.

affluence of developing nations. Indeed, the notion that class mobility is related to incidence of disease appears in several disciplinary domains.

We can also observe the "mismatch" hypothesis of evolutionary medicine, which proposes that our increased chronic disease burden can be attributed to the fact that our contemporary environment is a "mismatch" for our genetic constitution, which was formed in environments of evolutionary adaptedness, presumably generations before the present. According to the hypothesis, we are best suited to reliable aspects of past environments more than we fit our present niche. Evaluations of increased disease burden among first generation migrants to Westernized settings add support to the role of environmental mismatch in causing disease. Much of the research on discordance effects attribute disease incidence in migrants to novel immunological and dietary exposures; however, sociological approaches to stress research have implicated social organizational changes in the Westernization of migrants as factors that influence health. This approach draws upon the biological tradition of stress research as well as psychosomatic approaches which examine both personality and psychological states as predispositions to disease.[141] While evidence is mounting in support of the hygiene and mismatch hypotheses, these examples in sum illustrate that portraying increases in disease as a downside of modernity has been a human tendency for a long time.

While each generation believes they are more stressed than the last, several scholars have concluded that the persistent view of modernization as a negative phenomenon isn't inevitable. Sociologist Ruut Veenhoven has considered quality of life in relation to modernization and asserts that quality of life is a subjective matter;

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[141] A. J. J. M. Vingerhoets & F. H. G. Marcelissen, "Stress Research: Its Present Status and Issues for Future Developments," *Social Science and Medicine* 26(3) (1988), 282.

however, the negative view—that paradise is lost and is unlikely to be restored—prevails in social scientific discourse.[142] The victory of this view may be attributed to the influence of social theory upon explanatory models of modernization in the social sciences. For example, the concern that mechanization and specialization degrade work as predicted by Karl Marx, Émile Durkheim's fear that the disruption of the communal basis of morality would cause anomie and suicide, and Freud's assertion that civilization requires the increased repression of instinctual urges.[143] By the twentieth century, the field of epidemiology had begun to classify and quantify associations between stress-related diseases and lifestyle factors. Thus theoretical and popular speculations about the decline of health amid the advance of society were further imbued with legitimacy by the introduction of apparently objective statistical tools and positioning in the medial sphere. Related to this trend was the adoption of the positivist methodology of the physical sciences by social science fields such as sociology and anthropology. Americans have long associated civilization and disease and this assertion has been made concrete by the involvement of medical and public health disciplines. That these disciplinary lenses are focused on disease rather than on health, may have moved the characterization of modernization in a negative direction.

Social Science and Medicine

In the twentieth century, mergers between social science and medicine were happening on several fronts. In a 1992 essay, historian Sarah Tracy identifies social medicine, psychosomatic medicine, and constitutional medicine, as three prominent

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[142] Ruut Veenhoven, "Is Life Getting Better? How Long and Happily Do People Live in Modern Society?" *European Psychologist* 10(4) (2005), 331.
[143] Veenhoven, "Is Life Getting Better?" 331.

hybrid disciplines. Social medicine was focused on environmental and behavioral determinants of disease; psychosomatic medicine stressed ties between mind and body, especially the role of emotions in the pathogenic process; and constitutional medicine constructed "new human taxonomies on the basis of body type, behavior, endocrine function, and diathesis."[144] Of the three approaches, constitutional medicine, inspired by endocrine research that demonstrated the influence of an "individual's glandular balance on his or her behavior and physique," had a significant impact on the foundation of stress research in the social sciences.[145] As Tracy describes it, the constitutionalist approach is characterized by "a desire to restore order and balance at a variety of levels, both individual and social."[146] This not only implied a focus on physiological concepts of *milieu intérieur* or homeostasis, but also a Durkheimian ideal of equilibrium and stability in society. In historian Stephen Kunitz's history of holism, the imperative for a strong emphasis on tradition and community arose at this time because the "disruptions, in the late 19th and early 20th centuries caused by industrialization; by the internal and international migration of millions of people to rapidly expanding cities from rural communities by World War I" had led to a "pervasive sense of both personal and social fragmentation."[147]

During the first two decades of the twentieth century, constitutional medicine was anthropometric, concerned with the measurement of body frame and its correlation with observable symptoms.[148] In this framework, individuals with similar morphological

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[144] Sarah W. Tracy, "George Draper and American Constitutional Medicine, 1916-1946: Reinventing the Sick Man." *Bulletin of the History of Medicine* 66 (1992), 54.
[145] Tracy, "George Draper and American Constitutional Medicine," 58-59.
[146] Ibid., 59.
[147] Stephen J. Kunitz, "Holism and the Idea of General Susceptibility to Disease." *International Journal of Epidemiology* 31 (2002), 722.
[148] Tracy, "George Draper and American Constitutional Medicine," 56.

characteristics might react similarly to various environmental stresses, perhaps through an inherited idiosyncratic immune response.[149] The purview of constitutional medicine was the examination of "the aggregate of hereditarial characters, influenced more or less by the environment, which determines the individual's reaction, successful or unsuccessful, to the stress of the environment."[150] The constitutionalist perspective also marked a renewed focus on the nature of the individual sick person with the purpose of providing individualized therapies that treated both the immediate concern and "the equilibrium or 'fit' between the individual and his or her environment."[151]

In what was perhaps an effort to characterize individual patients in the 1920s and 1930s, constitutionalist George Draper created a taxonomy of "disease races," or a racial typology based on disease susceptibility.[152] Draper's system used clinical data to create a classificatory scheme based on predisposition to disease that attempted to "impose order on the 'hybrid' population of the twentieth century, segregating people of specific temperament and inclination to disease."[153] Similarly, during the 1940s and 1950s, constitutionalist William Sheldon's biological determinism, peppered with ethnic, racial, and gender prejudices, represented the extreme of the hereditarianism of constitutionalist perspectives. The peak of these views was arguably his book *Varieties of Delinquent Youth* based on a sample of adjudicated youth in Boston.[154] While Sheldon's eugenic views received substantial notoriety, Tracy argues that they were marginalized and were distinctly unpopular after the Holocaust.

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[149] Ibid.," 56.
[150] Sarah W. Tracy, "An Evolving Science of Man: The Transformation and Demise of American Constitutional Medicine, 1920-1950," In *Greater than the Parts: Holism in Biomedicine*, 1920-1950, edited by Christopher Lawrence & George Weisz, 161-188. New York: Oxford University Press, 1998.
[151] Tracy, "An Evolving Science of Man," 161-162.
[152] Tracy, "George Draper and American Constitutional Medicine," 57.
[153] Ibid., 59.
[154] Tracy, "An Evolving Science of Man," 178.

Though some constitutionalists envisioned themselves as public intellectuals or even social engineers, Tracy argues that clinical holism in clinical medicine never fully resonated with political and social concerns. Instead, she concludes that the concerns of "American constitutionalists were grounded more immediately in disciplinary developments within the medical profession than in the external political world."[155] Constitutional medicine, like other holistic movements, was a reaction to the loss of power among clinicians in an increasingly specialized, research-oriented medical profession, but as Tracy proposes, it was further encouraged by several other factors including the "concerns of clinicians and clinical researchers disturbed by the loss of an individual-oriented style of medical practice, investigation, and education; the related interests of an aging medical elite who wished to perpetuate a tradition that linked medicine and humanistic values; the agenda of biologists, anthropologists, and eugenicists interested in the development of human genetics; and the designs of physicians and foundations wishing to legitimate psychiatry's role within general medicine."[156]

To this end, constitutionalist physician Julius Bauer welcomed holistic perspectives into the medical curriculum. He asserted in *Constitution and Disease: Applied Constitutional Pathology* (1942) that medical students needed instruction in how to correlate facts from endocrinology and other disciplines to the condition of individual patients.[157] Bauer's impetus, like that of other holistic physicians, was on retaining emphasis on the observational skill of the physician in the individualized treatment of "the whole patient" in an environment increasingly characterized by laboratory

[155] Ibid., 163.
[156] Tracy, "George Draper and American Constitutional Medicine," 58.
[157] Ibid., 55.

methods.[158] This approach was not unique. The Rockefeller Institute as another example was recommending "various psychosomatic, social science, and social service approaches to counteract the dehumanizing consequences of scientific medicine."[159] To the constitutionalist physician, "disease was more than the sum of the patient's observable organic lesions;" it was "the expression of a conflict between a given external or environmental agent (such as a bacterium, a chemical toxin, physical violence, or psychic stress) and a given human being."[160]

Constitutionalist themes would reappear in 1974, as epidemiologist John Cassel proposed four principles to guide the epidemiological study of psychosocial factors in disease. Among these, Cassel proposed that "[i]n human populations the circumstances in which increased susceptibility to disease would occur would be those in which there is some evidence of social disorganization."[161] He also identified a protective effect for more "stabilizing" social processes, such as the strength of group supports provided to an individual. As his views illustrate, Cassel was an important link between the applied science of epidemiology in public health and Durkheim's work on suicide and its progeny. Variations in group relations, Cassel argued, do not have a specific etiological role in any disease, but rather, they enhance susceptibility to disease in general. He believed the effect would be particularly pronounced after infectious agents were no longer responsible for the major burden of disease.[162] In sum, Cassel's views constituted a critique of epidemiology at the time and were among several attempts to restructure the practice of medicine in response to the "epidemiologic transition," a theory proposed in

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[158] Ibid., 55.
[159] Ibid., 64.
[160] Ibid., 56.
[161] Kunitz, "Holism," 722.
[162] Ibid., 722-729.

1971 by Abdel R. Omran to explain demographic changes in the United States including the replacement of infection by chronic disease as the primary cause of death.[163]

At the base of his critique, Cassel felt that the practice of epidemiology relied too heavily on the germ theory of disease, which had evolved from the initial discovery of microorganisms into a ubiquitous model in which the cause of each disease could be attributed to a specific agent and in turn, each agent connected to a specific disease.[164] In Cassel's view, epidemiological inquiry based on this model focused attention on the attributes of these specific agents which led ultimately to erroneous conclusions.[165] He insisted that investigators dismantle the "mono-etiological model" by joining the efforts of social and health scientists.[166] With this new workforce, an etiological investigation could start with people exposed to a postulated etiologically relevant process and then commence by determining the spectrum of disorders that were a consequence.[167] As one example, Cassel noted that the "social experiences of people who subsequently develop tuberculosis or schizophrenia or who commit suicide are remarkably similar."[168] These people "frequently come from a broken family . . . live in an area in which they are a distinct minority, not accepted by the dominant majority . . . have had an excessive number of residential and occupational changes. . . are more likely to be single, divorced, or widowed . . . [and] have been subjected to mounting life stress without any period of remittance."[169]

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[163] Abdel R. Omran, "The Epidemiologic Transition: A Theory of the Epidemiology of Population Change." *The Milbank Quarterly* 83(4) (2005), 731–757.
[164] John Cassel, "Social Science Theory as a Source of Hypotheses in Epidemiological Research." *American Journal of Public Health* 54(9) (1964), 1482-1488.
[165] Cassel, "Social Science Theory," 1486.
[166] Ibid., 1484.
[167] Ibid., 1485.
[168] Ibid., 1485.
[169] Ibid., 1485.

Like constitutionalists who were concerned with environmental "fit," Cassel also described "incongruity" between people and their environment.[170] This contrast might be caused, he thought, by rapid rates of change, specifically urbanization and industrialization.[171] He found "greater likelihood of incongruity" for example, among rural populations who live in a county with a large city.[172] Cassel also had an interest in the degree of integration within a social group, because he believed it could confer protection against stressful circumstances; "the consequences of any deleterious set of circumstances need not be expressed in maladaptation of the physiological or psychological system if there are meaningful groups through which such individuals can derive adequate emotional support."[173] By his use of the term "maladaptation" here and reference to stress physiology, Cassel notably positions the social support hypothesis in relation to physiological stress research, thus effectively joining social science and basic science perspectives.

Social Epidemiology

While Cassel is one of the foundational figures in the creation of social epidemiology as a discipline, fundamental concepts attributed to modern proponents of the social determinants of health, including the notion of a class based gradient in disease prevalence and the belief that health is a human right, are no doubt quite old. In the mid- and late nineteenth century in Berlin, Rudolf Virchow expressed his belief that epidemics were the manifestation of social and economic maladjustment and he promoted the

[170] Ibid., 1487.
[171] Ibid., 1486.
[172] Ibid., 1487.
[173] Ibid., 1487.

scientific study of these social factors.[174] In Europe, William Farr added social class categories to age, sex, and location as descriptors of mortality in 1840.[175] In the United States, Joseph Goldberger, a physician in the Marine Service and Edgar Syndenstricker, a sociologist and economist experienced with statistics, launched data collection on diseases of poverty such as pellagra. Sydensticker is credited with the beginning of systematic data collection in epidemiology, pioneering more rigorous survey methods. After joining the US Public Health Service, he initiated national surveys such as the *National Health Interviews* and the *National Health Examination Survey* and these inspired other long-term national disease surveillance systems.[176] Indeed several figures were thinking about the class-based gradient in disease by the third decade of the twentieth century, though the field of social epidemiology had not yet congealed.[177]

As Susser and Stein describe it, the union of "soft" social and psychological fields with epidemiology and medicine, was fueled by methodological problems with the cross-sectional survey designs utilized in epidemiology and by the increased specialization of medical research, which made new space for nonmedical scientists. Psychologists and sociologists were both concerned with the construction of scales, interviewing and response bias, reliability, validity, and measurement error.[178] As has been discussed, the prominence of functionalism and positivism in these fields created "a period during which they strove to emulate, in the study of society, the rigor and methods of the physical sciences."[179] These factors caused a new breed of social and psychological

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[174] Mervyn Susser &Zena Stein. *Eras in Epidemiology: The Evolution of Ideas*. (New York: Oxford University Press, Inc., 2009), 150.
[175] Susser, *Eras in Epidemiology*, 150.
[176] Ibid., 158.
[177] Ibid., 161.
[178] Ibid., 179.
[179] Ibid., 179.

epidemiologists to emerge in the United States. Also important to changes in epidemiology was the discovery by Richard Doll and his mentor Austin Bradford Hill, that cigarette smoking was behind the rising epidemic of lung cancer. This discovery served to further shift the focus of epidemiology toward elucidating the causes of chronic disease.[180] Another important development in the formation of social epidemiology was the focus on studies of biomedicine by American sociologists. By the 1950's, work in medical sociology, especially that of Faris and Dunham in Chicago, had begun to examine the influence of social conditions on the causes of disease, mental disorders in particular.[181] In the late 1960's, physician Sydney Cobb and his student, Stanislav Kasl, at the University of Michigan, published their work on the psychosocial effects of stress and cardiovascular disease. S. Leonard Syme and Leo Reeder at the University of California Berkeley had also demonstrated the role of stress as a factor in cardiovascular disease and later Syme and his student Michael Marmot connected the incidence of cardiovascular disease morbidity in Japanese-Americans increased with degrees of Western acculturation.[182] Another of Syme's students, Lisa Berkman, in a study of Alameda County, CA residents from 1965-1974, devised a measure of social integration, including marital status, community group membership, contacts with family and friends, and related these measures to mortality.[183] Sydney Kark, who pioneered social medicine in South Africa and served as a mentor to John Cassel, developed a strong following of physicians, social psychologists, and sociologists who were interested in psychosocial

[180] Ibid., 227.
[181] Ibid., 228.
[182] Ibid., 228.
[183] Ibid., 228-229.

responses to social and economic factors.[184]

The Whitehall studies in 1967 and 1985 by Michael Marmot and Geoffrey Rose examined a cohort of British civil servants and found a risk of death among the lowest employment grade to be roughly three times that of the highest grade. Cardiovascular death rates mirrored this pattern though differences in smoking, blood pressure, and plasma cholesterol explained only part of the difference between grades. In follow-up, researchers determined that psychosocial occupational factors, such as low job control at the lowest civil servant grades, determined the risk. This type of inquiry was accompanied by examinations of cohort data focused on determining the adult impacts of early deprivation and the role of ethnicity in the distribution of health.[185]

According to S. Leonard Syme in the forward to the first textbook in social epidemiology, now widely utilized in schools of public health, the first formal training program in medical sociology began at Yale University in 1955 with the aim of discovering in what ways the study of social factors could shed light on the etiology of disease.[186] Affiliates of this perspective trace their history directly to Émile Durkheim's work on suicide. Durkheim famously claimed that suicide rates in countries and groups exhibit regular patterns across time, though individuals in these groups come and go. This trend suggested that the cause of suicide was to be found in the social environment of members of these groups. This perspective when applied to epidemiology, which had sought to identify disease risk factors within individuals, called for knowledge about the social environment to be brought to bear on a field that had viewed itself as a hard

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[184] Ibid., 230.
[185] Ibid., 233.
[186] S. Leonard Syme, "Forward," in *Social Epidemiology*, ed. Laurence J. Kirmayer et al. (New York: Cambridge University Press, 2007), 4.

science.[187] The attempted transformation of traditional epidemiology's clinically-minded disease classification scheme was fitted within broader holistic appeals, and was waged largely through the adoption of John Cassel's expansive, anti-reductionist perspectives on disease etiology supported by social statistics.

Roseto, Pennsylvania

Much of the early inquiry of the discipline of social epidemiology was focused on coronary artery disease. The prevalence of heart disease and incidence of cardiac accidents appeared to be rising during the mid-twentieth century and commentators suggested the increase followed trends in industrialization and urbanization; undeniably, heart disease seemed to particularly affect middle class, professional men. Hypertension, diet, and hereditary factors were all suspected. However, each seemed to provide only a partial explanation.[188] While a causal relationship between stress and heart disease had been suspected as early as the eighteenth century, Macleod and Davey Smith argue that the theory achieved widespread currency by 1950.[189] At mid-century, "modern stress" was characterized as "middle class, male angst (not dissimilar to what Rosenman and Friedman subsequently operationalized as Type A behavior) experienced amongst 'workers by brain' rather than 'workers by hand'. . ."[190] While manual workers experienced material deprivation more than non-manual workers, the latter appeared to be at risk because they experienced more stress.[191] Interestingly, this perspective would switch to its opposite in the 1970's toward a focus on the working environment of the

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[187] Syme, "Forward," x.
[188] John Macleod & George Davey Smith, "Commentary: Stress and the heart, 50 years of progress?" *International Journal of Epidemiology* 31 (2002), 1111.
[189] Macleod & Davey Smith, "Commentary," 1111.
[190] Ibid., 1111.
[191] Ibid., 1111.

blue collar class.[192] Then by the 1980s, the pendulum would swing back as personality factors of the white collar worker were delineated and associated with vulnerability to heart disease. More recently, these hypotheses exist in parallel. McEwen explains in 2002 that when it comes to cardiovascular disease, "[d]ominance, in particular, has its price."[193] In animal studies of unstable hierarchies, dominant monkeys showed "accelerated atherosclerosis," a cardiac risk-factor characterized by deposits of cholesterol and other substances inside the arteries.[194] In the Whitehall studies, British civil servants in the lowest job categories had the highest blood pressure and the ones at the top had the lowest.[195] McEwen explains these apparently contradictory findings by attributing cardiac risk factors at low job grades to loss of control—"perceived stress and loss of control make their effects known almost immediately on the heart."[196]

While the stress/disease hypothesis seems to be gaining ground in the present, in the mid-twentieth century, its future success was less clear. As coronary heart disease became an emblematic modern condition, hypotheses that linked stress and heart disease would be forced to marshal a defense against the increasingly salient theory that dietary fat was the more robust contributing factor to this cause of morbidity and mortality. A prospective study of heart disease in the Italian American town of Roseto, Pennsylvania conducted by sociologist Stewart Wolf and his colleague John G. Bruhn beginning in 1955 is an instructive example of attempts by stress researchers to assert the role of psychosocial causes of heart disease amidst competing hypotheses. While the study design has been critiqued by numerous other scholars since, its conclusions about the

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[192] Ibid., 1111.
[193] McEwen, *The End of Stress*, 69.
[194] Ibid., 69.
[195] Ibid., 69.
[196] Ibid., 70.

salient characteristics of healthy communities have persisted in social science circles to the present day.

The Pennsylvania town of Roseto, settled in the 1880's by immigrants from Roseto, Italy, was initially characterized by Wolf and Bruhn as both isolated from outside contacts and exemplifying a high degree of social cohesion and egalitarian ethos. According to the researchers, these social characteristics of Roseto, exemplified in particular from 1955-1961, protected Rosetans from myocardial infarction in comparison to neighboring communities. However, after this period, the community was exposed to the stress of Westernization to the detriment of their health. Wolf and Bruhn chose Roseto as their study site not just because of its egalitarian ethos, but also because Rosetans were generally overweight and consumed a high fat diet. Thus, Rosetans were an apparent contradiction to the diet hypothesis. While a national program was developing based on a correlation between elevated serum cholesterol levels and increased coronary heart disease risk, the Roseto Study reported finding an insignificant number of myocardial infarctions "where there was high fat ingestion in contrast to control communities" and "no correlation between fat consumption or high blood cholesterol and coronary atheroma."[197]

The Roseto Study had a prospective design focused on before and after surveillance of individuals exposed to an environmental hazard defined by the authors as "the rapid renunciation of long observed social values and behavior, the manifestations of which were very few and very slowly progressive until approximately 1965, when the

[197] Stewart Wolf, "Cholesterol's Role in Atherosclerosis." *Integrative Physiological and Behavioral Science* 35(1) (January-March 2000), 3.

evidence of such a social change became conspicuous."[198] The researchers elicited information about social change from Rosetans and the inhabitants of an adjacent control town, Bangor, PA, via structured sociological interviews.

In the authors' history of the town, Roseto was just one of several Pennsylvanian communities founded by Italian immigrants, but was unique in its homogeneity—it was exclusively "owned and operated" by Italians. In its early history, the town engaged in a vigorous rivalry with two other Italian-American communities, West Bangor and Pen Argyl. To resolve this conflict, Father de Nisco, a Catholic priest, emigrated 14 years after the original cohort to provide leadership and developed a comprehensive social program including education for the young.[199] According to Wolf and Bruhn, under his leadership, Roseto grew into a model community.

At the onset of Westernization, Wolf and Bruhn suggest that the first social tradition to change was the selection of marriage partners. Prior to the advent of social change, nearly all Rosetans married within their community and usually within their religious denomination.[200] From 1935-1944 more than 93% of spouses were of Italian heritage.[201] New half-Italian or non-Italian spouses after World War II were met with prejudice until 1985 when about eighty percent of Rosetans had married non-Italians and the social stigma had subsided.[202] According to the authors, the "sophisticating influences" of education and outside marriage first accelerated local industry and then inhibited it as men developed out-of town social connections.[203] Fewer Rosetans were in

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[198] Stewart Wolf & John G. Bruhn, *The Power of Clan*. (New Brunswick: Transaction Publishers, 1993), 102.
[199] Wolf & Bruhn, *The Power of Clan*, 112.
[200] Ibid., 112.
[201] Ibid., 114.
[202] Ibid., 114.
[203] Ibid., 114.

the unskilled or semi-skilled labor category at the second data collection point and the annual income had increased.[204] The authors also describe the industrialization of Roseto, which consisted of a shift from small businesses in Rosetans' homes to a Rosetan-owned textile finishing factory which opened in 1905, followed by more textile mills, a foundry, and a box company during the 1950s. By 1962 there were sixteen factories employing 450 workers.[205] The 1970s and 80s were characterized by "a trend away from local concerns and toward involvement with regional and national activities."[206] The younger generation of Rosetans no longer took over the management of shops from their parents and much to the researchers' dismay, "Rosetans began patronizing malls and restaurants away from Roseto."[207]

The authors of the Roseto study take particular care characterizing Rosetan social organizations, several of which were organized by parishioners of the church of Our Lady of Mt. Carmel. All Rosetan clubs appear to have been separated by gender until 1978.[208] The discussion of community organizations in *The Power of Clan* concludes with the authors' contention that Rosetans originally formed local groups and then increased their participation in national activities. By 1985, club informants felt that younger people were less interested in their organizations and that their groups were losing members.[209] In fact, total membership in youth organizations declined from 1,276 in 1963 to 479 in 1986.[210]

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[204] Ibid., 115-6.
[205] Ibid., 116.
[206] Ibid., 119.
[207] Ibid., 119.
[208] Ibid., 120.
[209] Ibid., 121.
[210] Ibid., 121.

Thus, the Rosetans became delocalized or "less self-contained."[211] As they became more educated and prosperous, "their contacts with the outside world broadened, they were also becoming less family-centered and less cohesive, less willing to sacrifice for family, friends, and neighbors."[212] The authors are further troubled that the number of three-generation households had decreased. In 1980, the population of Roseto had decreased by nearly 150, but in the same year the number of houses increased by more than 100.[213]

The conclusion of *The Power of Clan*, a book-length description of the study with photos of the town and its citizens, compares Roseto to the Roman Empire, which declined, Wolf and Bruhn suggest, when citizens became insensitive to their civil responsibilities. In the ancient civilizations of Greece and Rome as well as Roseto, Pennsylvania, there was "a coming together under early influence of inspirational leaders, followed by a period of comfortable prosperity. Ultimately, there developed signs of self-indulgence with a weakening of commitment to traditional values and a lack of responsibility for the community."[214] Social values changed with the new generation of young adults and just "four years after [Wolf and Bruhn's] prediction that abandonment of Roseto's traditional attitudes and behavior would be accompanied by a rise in the death rate from heart attack, the first young Rosetan succumbed to a myocardial infarction."[215] According to the authors, "the rapid and radical shifts in social standards and beliefs seem to have produced their effects with comparable swiftness."[216]

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[211] Ibid., 121.
[212] Ibid., 121.
[213] Ibid., 122.
[214] Ibid., 127.
[215] Ibid., 128.
[216] Ibid., 128.

The researchers suggest that the neurobiology of social behavior can elucidate "how, in a genetically, ethnically, and socially homogenous community, radical change can occur with such striking medical consequences."[217] As they explain the pathway, "[t]he steps involved in the formulation of a personal encounter, either threatening or supportive, begin with the stimulation of sensory endings, visual, auditory, tactile, or otherwise. Thus sights, sounds, odors, tastes, touches, pains, pressures, and 'vibes' from human relationships convey their messages, thereby the 'condensers' of the sensory nerves, which, in turn, transmit electrical energy via subsequent nerve connections into the brain and throughout manifold intercommunicating circuits that draw on stored memories, experiences, ingrained attitudes, values and standards, desires, aspirations, beliefs, algorithms of logic, and potentially everything previously learned."[218] As a result of the "salubrious social environment in Roseto created through the efforts of Father de Nisco," citizens enjoyed a "perception of being emotionally sustained and nourished."[219] Thus, "individual responses to otherwise stressful life experiences may have been muted as the assessment of potentially troublesome events by evaluative circuits in their brain were influenced by their sense of confidence, self-esteem, purposefulness, and well being."[220] However, "as necessity gave way to plenty and competition began to replace common purpose, new and more selfish influences were available to entrain the interpretive circuits of the brain and consequently the workings of the body."[221]

Wolf and Bruhn create Roseto as a mythological model of social cohesion; however, it is clear in retrospect that aspects of this portrayal reflect the social values of

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[217] Ibid., 129.
[218] Ibid., 129.
[219] Ibid., 130.
[220] Ibid., 130.
[221] Ibid., 130.

the mid-nineteen sixties. John Bruhn speculates on the cause of a few cases of cardiovascular disease among Rosetans: "The patients generally presented a different theme for dealing with the crises in their lives than the theme outlined previously for Rosetans. The majority of the patients stated that they kept their problems to themselves; they 'paddled their own canoes.' In addition, 50 per cent of the patients had only superficial religious ties. It is possible that these people may be isolates in their community and thus lack communal support when needed. As one respondent said, 'It is possible to be here in Roseto invisibly-outside the sphere of communication and activity.' It might be hypothesized that the persons with infarctions were alienated from or had rejected their primary groups such as the family, religion and peer group which provide mechanisms for dealing with situations which threaten the individual. Thus, the persons with infarctions might lack the support or 'cushion' which these groups provide when certain threats arise such as death, illness or uncertainties surrounding one's job or employment, which are outside the sphere of individual control."[222]

Wolf and Bruhn respond to the hypothesis that coronary artery disease is caused by diet by suggesting that study subjects' tendency to make major shifts in eating habits during emotional distress was more strongly correlated with myocardial infarction than the amount of food they ate and its caloric content.[223] Of the 283 Rosetans that completed both surveys, the authors conclude that there had been a reduction in the consumption of fats and oils during the interval between surveys even though the prevalence of coronary artery disease had increased. Smoking had also declined between

[222]Bruhn, John G, "An Epidemiological Study of Myocardial Infarctions in an Italian-American Community," *Journal of Chronic Disease* 18 (1965), 363.
[223] Wolf & Bruhn, *The Power of Clan*, 97-8.

surveys.[224] Further, the researchers did not measure physical activity, but do offer the suggestion that there is much less "walking about in Roseto than before."[225]

Researcher Ansel Keys, the primary proponent of the diet hypothesis in this period, was a major critic of The Roseto Study. According to Keys, "[t]he evidence offered from death data for 1955 to 1961 does not prove that in those years the people of Roseto differed significantly from average US white residents in the rate of death from arteriosclerotic heart disease . . . There is no basis to propose a protective effect of the emotional climate in Roseto."[226] As a scientist who promoted several popular diets, Keys' primary critique of the Roseto Study is not that psychological factors or even diet are the sole etiological factor for coronary heart disease, but rather that the measurement of dietary fat alone in the Roseto study is insufficient to exclude diet as a cause.[227] Keys suggested that the traditional diet of southern Italy is low in total fats and very low in saturated fatty acids.[228] Further, "dietary data from 1963 are not an acceptable estimate of the average diet in Roseto over the many years of atherogenesis preceding deaths recorded in 1955 to 1961."[229] Calculations of overweight among Rosetans, countered Keys, do not clarify whether or not the extra weight is related to obesity or muscle mass, ". . . 74% of the Rosetans were in the 'blue collar' class in which muscular development accounts for much more body weight than it does in the 'white collar' class."[230]

Despite these critiques, "The Roseto Effect" appears in recent social science and public health literature on the health promoting effects of social support. In popular

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[224] Ibid., 101.
[225] Ibid., 101.
[226] Ansel Keys, "Arteriosclerotic Heart Disease in Roseto, Pennsylvania," *JAMA* 195(2) (1966), 93-95.
[227] Keys, "Arteriosclerotic Heart Disease," 137.
[228] Ibid., 138.
[229] Ibid., 139.
[230] Ibid., 139.

media, the Roseto Study is described in Malcolm Gladwell's 2008 book *Outliers: The Story of Success*.[231] The popular recall of the Roseto Study has been used to describe an emotional influence of family and community ties on well-being and set the stage for a plethora of studies that associate intimacy and cardiovascular health, connect declines in health to the rising divorce rate, and link social isolation and loneliness to addictions, violence and chronic disease.

Despite the persistence of mono-etiological arguments, recent etiological hypotheses for cardiovascular disease can be characterized as more hybrid than they were in the era of the Roseto Study. The general consensus is that morbidity and mortality from this cause is multi-factorial, involving genetics, diet, physical activity, psychosocial factors, and even infection. Each of these contributors is a risk factor rather than a direct route to the disease outcome. Of note is Bruce McEwen's hypothesis for heart disease which merges psychosocial, endocrinological, and dietary perspectives. According to McEwen, the heart is an "exquisitely sensitive" part of the fight or flight system.[232] When we are stimulated, the body needs extra oxygen and glucose which requires the heart to beat faster and drive more blood, carrying oxygen and glucose, throughout the body. As he explains, not all challenges from the environment are extreme. The physiological stress response can be activated by "getting out of bed" and "running to catch the bus."[233] Whatever the cause, "repeated changes in blood pressure can become an illness known as hypertension . . . a risk factor for heart attacks, especially when the condition known as atherosclerosis is present."[234] The process of atherosclerotic plaque

[231] Malcolm Gladwell, *Outliers: The Story of Success*. (New York: Little, Brown and Company, 2008).
[232] McEwen, *The End of Stress*, 67.
[233] Ibid., 68.
[234] Ibid., 68.

formation is also tied to diet, McEwen explains, when we "grab a bag of potato chips, or eat a hamburger and french fries while writing a report, excess calories, coupled with high cortisol from feeling under stress, can lead to the buildup of fat in those two very unhealthy places—blood vessel walls and the abdomen."[235] In a 2007 article, McEwen lists social support among other behavioral interventions for stress: "Social support in the form of having regular social contacts with supportive friends or family or health professionals, who provide emotional support and provide useful information, has been shown to reduce the allostatic load score, which measures key physiological markers related to chronic stress . . ."[236] As the preceding analyses illustrate, emphasis on particular qualities of social relations as a therapeutic for stress has a deep history. However, it remains to be seen if the association between health and social support, variously defined, is an artifact of this history or a robust prevention strategy for stress related disease.

Social Support

As I have illustrated, Wolf and Bruhn's discovery of "social pathologies" in the breakdown of traditional communities reflects a concept that precedes the Roseto Study. In the nineteenth century, French sociologist Émile Durkheim ". . . tied modern urban life to declining birth rates, increasing alienation, and exacerbated gender role tensions, which, he believed, had negative health consequences, evidenced by increased suicide rates."[237] This perspective infused the discipline of sociology as well as progressive

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[235] Ibid., 69.
[236] Bruce McEwen, "Physiology and Neurobiology of Stress and Adaptation: Central Role of the Brain." *Physiol Rev* 87 (2007), 894.
[237] Howard Kushner & Claire E. Sterk. "The Limits of Social Capital: Durkheim, Suicide, and Social Cohesion." *American Journal of Public Health* 95 (7) (July 2005),1.

reform from the 1890s to the 1920s. Kunitz has described early sociologists as a relatively homogenous group of white Protestants from small towns and farms who shared a belief, like Durkheim, in the importance of group cohesion, social equilibrium, and consensus and viewed the expanding industrial cities and the transformation from traditional to modern as implying secularization, individualization, alienation, and anomie.[238]

While Durkheim's sociology is one of the more powerful influences on the social support paradigm in the social sciences, there are also other theoretical underpinnings.[239] These include the work of psychoanalyst John Bowlby whose description of attachment theory, built upon his belief in a universal human need to form close affectional bonds, served to relate the quality of maternal/infant attachment in early life to adult development and argue for the importance of social bonds across the life course. In his 1969 book *Attachment and Loss*, Bowlby described social bonds as having a both a psychological and physiological quality; "Secure attachment provides an external ring of psychological protection which maintains the child's metabolism in a stable state, similar to [the] internal homeostasis mechanism of blood pressure and control."[240] Bowlby's work may be viewed as providing a biological rationale for the cultural practices of motherhood and pair-bonding. For example, Bowlby viewed adult marriage as health promoting in that it was the functional equivalent of the bond between mother and child.[241] Also influential to the development of the social support paradigm were anthropologists Elizabeth Bott and John Barnes who developed the concept of social

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[238] Kunitz, "Holism," 723.
[239] Lisa F. Berkman, Thomas Glass, Ian Brissette, Teresa Seeman, "From Social Integration to Health: Durkheim in the New Millenium," *Social Science and Medicine* 51 (2000), 844.
[240] Berkman et al., "From Social Integration to Health," 844.
[241] Ibid., 844.

networks in the mid-1950s to analyze ties that cut across kinship groups and quantitative sociologists Claude Fischer, Edward Laumann, Barry Wellman, and Peter Marsden who developed network analysis. Like the Durkhiemian and later structural functionalist concepts of culture as a separate and objectively measurable collection of social facts that exists as a shaping force outside of individual will or psychology, network analysis focuses on "the characteristic patterns of ties between actors in a social system . . . to study how these social structures constrain network member's behavior."[242] Thus, "by assessing actual ties between network members, one can empirically test whether community exists."[243] Network analysis research in the health sciences, often similar in philosophy to the Roseto study, examines the strength and number of social ties in order to characterize communities and then relates these findings to the incidence and prevalence of disease among community members.

Historian Howard I. Kushner and anthropologist Claire E. Sterk have argued that the reference to Durkheim in social epidemiological approaches to public health is quite intentional; they describe the use of classical social theorists in public health scholarship as a way to authenticate claims that social capital is a protective factor in population health.[244] According to a 2000 article by researchers from the social epidemiology camp, "In *Suicide*, Durkheim challenges us to understand how the patterning of one of the most psychological, intimate, and, on the surface, individual acts rests not upon psychological foundations, but upon the patterning of 'social facts' . . . 'social facts' can be used to explain changing patterns of aggregate tendency toward suicide."[245] Thus according to

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[242] Ibid., 844.
[243] Ibid., 844.
[244] Kushner & Sterk, "The Limits of Social Capital," 1.
[245] Berkman et al., "From Social Integration to Health," 844.

Durkheim's theory, statistical suicide rates can be attributed to "the level of social integration of the group."[246] Durkheim related anomic suicide in particular to "large scale societal crises of an economic or political nature often occurring during times of rapid social change and turbulence. In these situations, social control and norms are weakened (e.g. the regulatory function of integration)."[247] As Berkman et al. explain, "Such rapid change serves to deregulate values, beliefs and general norms and fails to rein in and guide our individual aspirations."[248]

Social support is defined in various ways by stress researchers, but in most cases this "dark side" of social support, social control, is downplayed in the literature. Rather, it appears regularly as Bowlby might have conceptualized it, with implied emotional affection, and as coping resource including instrumental, informational, or emotional assistance, performed for an individual by significant others, such as family members and friends.[249] In network approaches, support refers to the organization of people's relationships to each other including the number of social roles a person has, the density of the relationships a person has with their network members, and the frequency of contact with them. Social support measures propose to capture the "degree of social isolation/integration or social embeddedness" for individuals.[250] Extrapolated to the group level, measures of civic participation or trust describe social cohesion as a characteristic of a group or a culture. As Moore et al. explain in their description of the translation of social capital by public health, ". . . public health researchers have

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[246] Ibid., 844.
[247] Ibid., 844.
[248] Ibid., 844.
[249] Peggy Thoits, "Stress, Coping, and Social Support Processes: Where Are we? What Next?" *Journal of Health and Social Behavior* 35 (1995), 64.
[250] Thoits, "Stress, Coping, and Social Support Processes," 64.

privileged communitarian definitions of social capital and marginalized network definitions. . .”[251] This tendency may be traced to the influence of political scientist Robert Putnam who defined social capital as “features of social life—networks, norms, and trust—that can improve the efficiency of society by facilitating coordinated actions.”[252] In a pivotal 1995 essay, Putnam described the loss of an American tradition of socialization, civic engagement (broadly defined as political participation), “good neighborliness,” and social trust.[253] This essay provided the framework for his 2000 National Best Seller, *Bowling Alone: The Collapse and Revival of American Community*, which described American’s limited participation in bowling leagues and other voluntary associations as indicators of social fragmentation in modern society.[254] Though similar to the conclusions of the Roseto Study which began nearly forty years before, Putnam’s thesis infused the discipline of political science with concern over modern forms of disengagement and supported the development of a science of civic responsibility and voter turnout.

The finding that measures of social integration are directly and positively related to mental and physical health, including lower mortality, is widely accepted among social science researchers. The impetus for the acceptance of this conclusion is a definition of population health that contends that it is more than the arithmetic sum of the health of the individuals that comprise groups and that, “there is something inherently ‘social’ about improving public health that cannot be reduced to studying and changing discrete

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[251] Spencer Moore, Alan Shiell, Penelope Hawe, and Valerie A. Haines. “The Privileging of Communitarian Ideas: Citation Practices and the Translation of Social Capital Into Public Health Research,” *American Journal of Public Health* 95(8) (August 2005), 1330.
[252] Moore, et al., “The Privileging of Communitarian Ideas,” 1331.
[253] Robert Putnam, “Bowling Alone: America's Declining Social Capital,” *Journal of Democracy* 6(1) (1995), 65-78.
[254] Robert Putnam, *Bowling Alone: The Collapse and Revival of American Community*. (New York: Simon & Schuster, 2000).

individuals."[255] It is easy to observe Durkheim's influence on this definition. It is a sociological theory of health determination and seems to exist as a counterpoint to psychologically-informed interventions aimed at encouraging voluntary changes in health behavior. As such, improvements to health are reliant on cultural change, however change may remain outside of the capacity of individual actors. The public health focus on *psychosocial* aspects of social capital may be similar. An illustrative example is Oscar Lewis's thesis on the "culture of poverty." In 1998, he described his theory as a set of psychological and ideological traits characterized as feelings of marginality, helplessness and dependency, of "not belonging," and contrasted it with the experience of belonging to a community with a shared set of beliefs.[256] The people in a culture of poverty ". . . are like aliens in their own country, convinced that the existing institutions do not serve their interests and needs. Along with this feeling of powerlessness is a widespread feeling of inferiority, of personal unworthiness."[257] Lewis concludes his essay with a suggestion that a change in perception can precede economic development: "It is conceivable that some countries can eliminate the culture of poverty (at least in the early stages of their industrial revolution) without at first eliminating impoverishment, by changing the value systems and attitudes of the people so they no longer feel helpless and homeless—so they begin to feel that they are living in their own country, with their institutions, their government and their leadership."[258]

As Muntaner, Lynch, and Davey Smith describe it, the appearance of social capital in social epidemiology and public health since the 1990s, "is coined in terms of a

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[255] Carles Muntaner, John Lynch, & George Davey Smith, "Social Capital and the Third Way in Public Health," *Critical Public Health*, 10(2) (2000), 110.
[256] Oscar Lewis, "The Culture of Poverty," *Society,* 35(2) (January/February 1998), 7.
[257] Lewis, "The Culture of Poverty," 7.
[258] Ibid., 9.

lay/common sense social psychology that has great appeal in the U.S."[259] This view has cross-cutting appeal; "Who would oppose the notion that civic participation, trust in communities, good neighborly relations are good for health?"[260] At the same time, its communitarian underpinnings also imply a weak role for central government in provisioning health, which is "an idea that nicely justifies the privatization of health services, such as managed care."[261] In fact, these authors argue, social capital mirrors "Third Way" policies in Germany, the UK, and the US, which present more conservative reform measures as an alternative to state-centered economic redistribution policies that might create a living wage, full employment, or universal healthcare.[262]

Kushner and Sterk conclude: "Despite ongoing critique, the number of studies claiming a relation between social capital and improved population health seems undiminished."[263] Harrington finds evidence of social cohesion theory among modern proponents of mind-body medicine who "express their nostalgia for a fantasized premodern past when we all were whole and integrated, mind and body." She further identifies a "nostalgia narrative of mind-body medicine," that "insists we suffer so much from stress, not because modern life is so overwhelming, but because it has robbed us of community and intimacy, leaving us with no friends, no network of supportive comrades to buffer and aid us in facing life's challenges." She continues by describing the support for this concept marshaled by the social science community in the form of cohort studies of "close-knit communities in heartland America where people do not die of heart attacks, children in orphanages who fail to grow properly, [and] women with breast

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[259] Muntaner et al., "Social Capital," 113.
[260] Ibid., 113.
[261] Ibid., 116.
[262] Ibid., 107.
[263] Kushner & Sterk, "The Limits of Social Capital," 1.

cancer who seem to live longer because they meet to share their troubles . . ."[264] Harrington is correct her recognition that this is a powerful narrative, perhaps one that conceals a political agenda.

A line of recent research on social support seems to speak particularly to the Roseto Study. Inquiries into "best matches" for social support appear to be "similar others" and community-level social integration measures find that the sense that an individual has support may depend upon the homogeneity of social groups.[265] According to Kawachi et al., "Bonding social capital refers to trusting and co-operative relations between members of a network who are similar in terms of social identity (e.g. race/ethnicity) . . ."[266] This construction of difference as damaging to human health facilitated the link between stress research and examinations of race relations in the United States. At the same time, the definition of stress and the construction of human vulnerability mutated to accommodate this new application.

Chapter III

Racism and Disease

The classification of racism as a physiological stressor relies upon prior research connecting health to the quality of interpersonal relations. Influenced by Robert Putnam's vision of healthy communities, social scientists have described race relations in the United States as creating environments characterized by mistrust that require novel levels of vigilance on the part of citizens. Yet, while "racism exists at multiple levels,

[264] Harrington, *The Cure Within*, 29.
[265] Thoits, "Stress, Coping, and Social Support Processes," 67.
[266] Ichiro Kawachi, Daniel Kim, Adam Coutts, and S.V. Subramanian, "Commentary: Reconciling the Three Accounts of Social Capital," *International Journal of Epidemiology*, 33 (2004), 682.

including interpersonal, environmental, institutional, and cultural . . . the bulk of empirical research on coping with racism focuses on strategies for coping with interpersonal racism" or "directly perceived discriminatory interactions between individuals whether in their institutional roles or as public and private individuals.''[267] In a 2009 review of the literature, racial identity development, social support seeking, and anger suppression and expression were identified as the primary individual-level strategies for coping with interpersonal racism.[268] The experience of racism has been correlated with self-reported psychological distress and depressive symptoms, resting blood pressure levels, and cardiovascular reactivity and interpersonal and institutional racism have been theorized as an explanation for differential health status between social groups.[269]

"Race" first attained prominence in United States medical research in the 1700s. According to social epidemiologist Nancy Krieger, its appearance was related to the institutionalization of the "one drop rule," which suggested that one drop of African blood could classify someone as "black." This distinction was followed by the efforts of prominent scientists and physicians to find biological racial differences. In this framework, race itself, not racial subordination, was the root cause of racial inequalities in health.[270] In 1950, in response to Nazi eugenics, the United Nations released a statement on race that rebutted the validity of race as a biologic category.[271] This statement and subsequent revisions suggest that though distributions of genetic traits vary

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[267] Elizabeth Brondolo, Nisha Brady ver Halen, Melissa Pencille, Danielle Beatty, & Richard J. Contrada, "Coping with racism: a selective review of the literature and a theoretical and methodological critique," *Journal of Behavioral Medicine,* 32 (2009), 65.
[268] Brondolo et al., "Coping with Racism," 64.
[269] Ibid., 65.
[270] Nancy Krieger, "Discrimination and Health," in *Social Epidemiology*, eds. Laurence J. Kirmayer et al. (New York: Cambridge University Press, 2007), 66.
[271] Krieger, "Discrimination and Health," 66.

across geographic regions, no traits exist that reliably delineate distinct "races." Instead, races reflect social and ideological conventions.[272] There is more similarity than difference across the human species and there are more biological differences within racial groups than between them.

Despite the reality that race is an imprecise measure; a main focus of social epidemiologists is on racial health disparities. The term health disparity refers to differences in morbidity and mortality among population groups defined by socioeconomic status, gender, and especially race or ethnicity.[273] Thus, while racial categories are culturally constructed in reference to skin tone and may be inexact across studies, those who identify as African American appear to suffer more on nearly every health status indicator measured than other population groups in America. Further, just a few conditions may explain excess mortality in African Americans. The greatest contributors to differential well-being appear to include heart disease, hypertension, HIV, lung cancer, breast cancer, stroke, diabetes, and homicide.[274]

These statistical phenomena have made explanatory models for racial health disparities a major public health priority in recent years. Five theoretical models have emerged from these inquiries including a racial-genetic model, a health-behavior model, a socioeconomic status model, a psychosocial stress model, and a structural-constructivist model.[275] Each model selects a trait evidently characteristic of African Americans as a racial group to explain health disparity. The racial-genetic model emphasizes population differences in the distribution of genetic variants. Genes are under strong selection

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[272] Ibid., 67.
[273] William W. Dressler, Kathryn S. Oths, and Clarence C. Gravlee, "Race and Ethnicity in Public Health Research: Models to Explain Health Disparities," *Annual Review of Anthropology* 34 (2005), 232.
[274] Dressler, Oths, Gravlee, "Race and Ethnicity in Public Health Research," 233.
[275] Ibid., 231.

pressure in response to local diseases; however, our inability to identify a single genetic antecedent for most diseases, a high degree of genetic admixture among U.S. populations, and the fact that gene expression is heavily reliant on environmental factors mean that this explanation is not likely as a stand-alone framework. The health-behavior model emphasizes differences between ethnic groups in the distribution of voluntarily adopted individual behaviors related to health, such as diet, exercise, and tobacco use. Though this model is generally adopted by psychologists, there is increasing recognition that environmental constraints limit the adoption of health-related behaviors. Nonetheless, this theory has directed the design of a countless number of interventions, but suffers from its assumption that the above behaviors adhere to racial categories. The socio-economic status model positions the over-representation of some racial and ethnic groups within lower socioeconomic categories as the cause of health disparities. While controlling for socioeconomic status (SES) fails to account for all racial and ethnic disparities in health, there is significant confounding between SES and race. However, access to quality healthcare and diet do not fully explain this confounding, which has led several scholars to suspect differential positioning in the social hierarchy as one possible explanation. The residual disparity after controlling for socio-economic status also inspired the psychosocial stress model which emphasizes the role of stresses associated with minority group status in creating health disparities, especially the experience of interpersonal and institutional racism and discrimination.[276]

Dressler et al. outline three approaches to the study of psychosocial stress in response to discrimination. One approach views psychosocial stress as the cause of negative affect or depression, which has been associated in a variety of studies with poor

[276] Ibid., 238.

health outcomes. Another approach taken by social epidemiologists, in particular, Krieger and Williams, is characterized by two interacting themes. The first, institutional racism, explains African Americans' reduced economic well-being and consequent barriers to accessing health-promoting resources, and the second, perceived racism, refers to "the conscious perception of discriminatory acts and practices and the distress associated with that perception."[277] Perceived racism is measured by self-reported experiences of discriminatory acts in institutional interactions as well as mundane social interactions.[278] Attempts to associate perceived discrimination with health risks has so far had mixed results, but remains a popular area of study.[279]

Discrimination is difficult to measure; therefore, investigators have compared the health outcomes of dominant and subordinate groups. If differences among these exist after controlling for known risk factors for the disease outcome in question, "aspects of discrimination may be inferred as a possible explanation for remaining disparities."[280] These studies are often cross-sectional, but researchers point to evidence of a dose-response relationship between experiences of racial discrimination and various health outcomes.

Recent approaches linking psychosocial stress, racism, and chronic disease have roots in the early work of social psychologist, Ernest Harburg (1973), and the subsequent work of social epidemiologist, Sherman James, on the John Henryism hypothesis (1983). Harburg argued that black or white persons living in high "socioecologic stress areas" characterized by low socioeconomic status and high rates of social instability as

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[277] Ibid., 239.
[278] Ibid., 239.
[279] Ibid., 239.
[280] Krieger, "Discrimination and Health," 4.

measured by crime were at higher risk for stressful experiences on a daily basis which increased their blood-pressure.[281] Harburg and colleagues hypothesized that "socially disorganized life areas generate problem situations requiring adaptation more often and with less resources for solution than more organized areas."[282] In this framework, for African Americans, and "especially darker-skinned black men, there was the added insult of racist interactions (with police or other representatives of the white power establishment). These racist interactions were in turn likely to provoke hostility on the part of the black participant in the interaction, who may then suppress that hostility to avoid negative repercussions. The model thus predicted that darker-skinned black men who lived in high stress areas and suppressed hostility would have the highest blood pressures."[283] Attributing the cause of higher rates of cardiovascular disease among African-Americans to prolonged, high-effort coping with difficult psychological stressors, the John Henryism hypothesis is "named for the mythic black steel driver who, in the face of seemingly insurmountable odds, refused to be deterred in his efforts."[284] In a series of studies, James found that African Americans who attempt to control behavioral stressors through hard work and determination, who exhibit a "tenacious and active coping style have higher blood pressure and a higher prevalence of hypertension if they also have fewer resources, such as higher educational attainment, for achieving their goals."[285] A 1982 study by James specifically situated education and John Henryism as factors that raise or lower autonomic arousal when individuals encounter behavioral

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[281] Ernest Harburg, John C. Erfurt, Catherine Chape, Louise S. Hauenstein, William J. Schull, & M.A. Schork, "Sociological Stressor Areas and Black-White Blood Pressure: Detroit," *Journal of Chronic Disease*, 26 (1973), 595.
[282] Harburg et al., "Sociological Stressor Areas," 595.
[283] Dressler, Oths, Gravlee, "Race and Ethnicity in Public Health Research," 240.
[284] Ibid., 240.
[285] Ibid., 240.

stressors in everyday life.[286]

In a 1991 paper, anthropologist William Dressler examined the "role of social support in moderating the risk of higher blood pressure associated with a specific form of status incongruence—lifestyle incongruity—in an African-American community in the rural South."[287] Dressler defined status incongruence and related elevated blood pressure as enhanced by social and cultural change in African American communities: "The opportunities afforded by the civil rights movement have enabled the black middle class to grow beyond its historically small proportions. Upward mobility and success have become the watchwords of a new age in the black community. But promise remains unfulfilled and aspirations are frequently dashed, as even a cursory review of economic statistics for the African-American community will show. As such, it is virtually assured that some persons in the black community will be struggling to maintain a conventional middle-class lifestyle in the context of low socioeconomic status."[288] Recalling constitutionalist medicine and epidemiologist John Cassel's concern with environmental "fit," Dressler warns of the danger of being an outlier in one's culture: "In effect, the incongruent individual may be hypervigilant in social interaction, attempting to 'convince' others, as it were, of his or her true status."[289] As we will see, hypervigilance is a stressor that can purportedly pose a significant threat to health. However, Dressler concludes, reliance on an extended network for social support can buffer the impact of status incongruity as a stressor.[290] This example illustrates an important change from the

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[286] Sherman A. James, Sue A. Harnett, and William D. Kalsbeek, "John Henryism and Blood Pressure Differences Among Black Men," *Journal of Behavioral Medicine*, 6(3) (1983), 259.
[287] William W. Dressler, "Social Support, Lifestyle Incongruity, and Arterial Blood Pressure in a Southern Black Community," *Psychosomatic Medicine*, 53 (1991), 609.
[288] Dressler, "Social Support," 611.
[289] Ibid., 612.
[290] Dressler, Oths, Gravlee, "Race and Ethnicity in Public Health Research," 240.

original construction of stress by Selye and others. In this example, stressors are not localized to a specific, unique moment in time, i.e. a stressful event, nor are they avoidable by individual behavioral adaptation. When stress is inherent in the environment, in the context of everyday experiences, it appears to be impossible to avoid.

Cumulative Wear and Tear

The American Psychiatric Association added post-traumatic stress disorder (PTSD) to existing diagnostic categories in the early 1980s in response to lobbying by mental health workers and lay activists on behalf of Vietnam veterans.[291] In the 1980 definition, "PTSD is precipitated by an event that would cause great distress to almost anyone; and with the revised 1987 edition, came the added stipulation that such an event 'must lie outside the range of normal human experience.'"[292] The category has rapidly expanded, particularly since 1990, to include natural disasters, work accidents and domestic abuse.[293] Historians Mark Micale and Paul Lerner suggest that the entry for PTSD in the Diagnostic and Statistical Manual (DSM) has spawned Congressional funding for PTSD care and the establishment of a national center, a plethora of scientific literature and autobiography, a new clinical specialty called "psychotraumatology," journals and professional societies, self-help literatures and media special interest stories. They conclude that PTSD is "the fastest growing and most influential diagnosis in American psychiatry."[294]

The instances of stress in the PSTD framework are generally described as acute and severe with lasting effects. However, narratives about the stressful nature of modern

[291] Lerner & Micale, *Trauma, Psychiatry, and History*, 2.
[292] Ibid., 1.
[293] Ibid., 1.
[294] Ibid., 3.

life, would begin to define chronic stress as an experience separated from disasters and accidents—a distinction that has the potential to capture nearly everyone within the stress framework. Among social epidemiologists, a book and essay titled *Everyday Racism* by Philomena Essed, define racism as concerned with mundane, repeated, often unconscious practices rather than extreme one-off incidents.[295] Essed attributes her definition to changes in sociology, in particular the emergence of microsociology, which resolved the traditional bias toward grand events with a new focus on the everyday and the mundane: "The notion of "everyday" is used to refer to a familiar world, a world of practical interest, a world of practices with which we are socialized in order to manage the system."[296] Essed developed the concept of everyday racism was developed in two comparative studies focused on the Netherlands and the U.S. Her definition of racism as "inherent in culture and social order . . . As a process it is routinely created and reinforced through every day practices" is viewed as foundational among social epidemiologists who are concerned with racism as a causal factor in chronic disease.[297]

As Selye explained "wear and tear" in relation to aging, the concept of cumulative damage re-emerges in the newly expanded stress framework to describe the effect of daily stressors. In this framework, "we are complex, self-regulating machines who must husband our energies properly if we are not to risk permanently damaging ourselves."[298] According to Harrington, stress is the central scientific concept of this new narrative and it is because "modern life makes demands on us that are fundamentally unnatural."[299] As

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[295] Philomena Essed, "Everyday Racism," in *A Companion to Racial and Ethnic Studies*, edited by David Theo Goldberg & John Solomos. (Malden: Blackwell Publishers, Ltd., 2002), 204.
[296] Essed, Philomena, *Understanding Everyday Racism: An Interdisciplinary Theory* (Newbury Park, California: Sage Publications, Inc., 1991), 2.
[297] Essed, "Everyday Racism," 205.
[298] Harrington, *The Cure Within*, 140.
[299] Ibid., 141.

Bruce McEwen explains, "[o]nce the challenge from the environment is met, the parasympathetic nervous system makes sure that the body's priority shifts back to satisfying those internal needs. But when the challenge comes up too often or goes on for too long, or when some abnormal condition disturbs the allostatic response, the parasympathetic nervous system is blocked from serving the ongoing needs of the body, and the result is allostatic load."[300] Allostatic load is related to race because socioeconomic inequalities generate life conditions that are chronically stressful over the life course of black Americans. The process by which these social conditions affect biology is what behavioral scientist Arline T. Geronimus refers to as "weathering," or the chronic, allostatic load generated by this continuing adaptation to enduring structures of inequality. Geronimus proposed the "weathering" hypothesis in 1991 to explain why African Americans experience early health deterioration as a result of the cumulative impact of repeated experience with social or economic adversity and political marginalization.[301] According to the hypothesis, the stress of living in a racially-conscious society that disadvantages African Americans "may cause disproportionate physiological deterioration, such that a Black individual may show the morbidity and mortality typical of a White individual who is significantly older."[302] In this framework, physiological damage is caused by persistent, high-effort coping with acute and chronic stressors and may be measured by several biomarkers including the measurement of substances that the body releases in response to stress – norepinephrine, epinephrine, cortisol, and dehydroepiandrosterone sulfate (DHEA-S)—and the effects of these primary

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[300] McEwen, *The End of Stress*, 73.
[301] Geronimus, Arline, Margaret Hicken, Danya Keene, John Bound, "'Weathering' and Age Patterns of Allostatic Load Scores among Blacks and Whites in the United States," *American Journal of Public Health* 96(5) (May 2006), 826-833.
[302] Geronimus, "Weathering," 826.

mediators including elevated systolic and diastolic blood pressures, cholesterol levels, glycated hemoglobin levels (indicating poorer control of blood glucose levels), and waist-to-hip ratios.[303] As Geronimus explains, weathering "is a collision of the cultural construction of mundane life goals with a social structure of ethnoracial stratification."[304]

Allostasis is an adaptation of Cannon's concept of homeostasis by biologists Peter Sterling and Joseph Eyer. The difference between the two concepts, Sterling contended, is that homeostasis described stability in the face of change and a physiological setpoint or "normal" operating parameter, while allostasis suggests that the goal of regulation is not adherence to constancy, but fitness under natural selection.[305] Like other researchers before him, Sterling further claimed that allostatic mechanisms interacted with certain aspects of modern social organization to produce several diseases.[306]

Sterling claimed his theory originated from his experience teaching neuroscience and engaging in social activism in the 1960's. As he explained in a 2004 essay: "In the mid-1960s, canvassing door-to-door in African-American ghettos such as Central and Hough in Cleveland, Ohio, I noticed that many people who answered my knock were partially paralyzed – faces sagging on one side, walking with a limp and a crutch. The cause was 'stroke', a rare affliction in my own community, and one that I never encountered later when canvassing in white, upper-class Brookline, Massachusetts. What caused so many strokes, I wondered, and how might they be connected to Cleveland's racial segregation?"[307] Sterling argued along with others that the connection between

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[303] Geronimus, "Weathering,"826.
[304] Dressler, Oths, Gravlee, "Race and Ethnicity in Public Health Research," 240.
[305] Peter Sterling, "Principles of allostasis: optimal design, predictive regulation, pathophysiology and rational therapeutics," in *Allostasis, Homeostasis, and the Costs of Adaptation*, ed. J. Schulkin (Cambridge: Cambridge University Press, 2004), 2-3.
[306] Sterling, "Principles of Allostasis," 3.
[307] Ibid., 3.

stress and heart disease represented a deeper causal pathway for cardiovascular disease: "Back then, standard medicine attributed essential hypertension and atherosclerosis to excessive consumption of salt and fat – as though what people chose to eat was unrelated to their internal physiological and mental states. So it was compelling to learn that the peripheral hormones that raise blood pressure, such as angiotensin, aldosterone, and cortisol, also modulate brain regions that stimulate hunger for sodium. Similarly peripheral hormones that increase catabolism, such as cortisol, also modulate brain regions that stimulate hunger for energy-rich substrates – fat and carbohydrates."[308] Though Sterling's hypothesis situates the brain in a central position in that social stress operates on physiological systems and these control behavior, there is no particular room for individual action to over-ride these impulses. The stress hypothesis thus contradicts the "unhealthy choices" rhetoric prevalent in psychological health behavior models that prescribe voluntary dietary modification as heart disease prevention. Instead, Sterling asserts that physiology is directly sensitive to social relations, without any mediation by cognition.

Sterling is one of the early researchers to attribute the increased prevalence of essential hypertension among African Americans to chronic hyper-vigilance which he claimed is required in urban environments: "The homeostasis model cannot explain essential hypertension because it attributes all pathology to a "defect" – to something "broken". But the allostasis model suggests that there is no defect. More parsimoniously, it proposes that hypertension emerges as the concerted response of multiple neural effectors to prediction of a need for vigilance."[309] Vigilance is required

[308] Ibid., 4.
[309] Ibid., 18.

in modern society more than ever before. In one example named by Sterling, schooling at age six requires children to be "raised by strangers" and this in turn raises blood pressure beginning at an early age.[310] Despite his definition of allostasis as describing fitness under natural selection rather than the maintenance of constancy as implied by Walter Cannon's term homeostasis, Sterling contends that disease is a feature of disruptions to social equilibrium: "Established hypertension is most common in segments of modern society where family structure is most disrupted, where children are least protected, and where they are marked from birth for suspicion and various forms of ill-treatment."[311] Further he suggests the reduction of racism in public policy has increased threats to the cohesion of communities: "Although the most overtly repressive forms of racism, such as lynching and legally enforced segregation of public facilities, have declined since the 1960s, de facto segregation of neighborhoods and schools has actually expanded, as has the disparity in wealth between rich and poor. These trends intensify the sense of wariness between inhabitants of the ghetto and the outside – which enhances everyone's vigilance."[312] Sterling also speaks to those that postulate biological differences between races as an explanation for rates of essential hypertension among African Americans: "There is no need to postulate a 'defect' in any particular regulatory pathway. Certainly we can create a hypertensive mouse by knocking out one gene or another. But we can also create hypertension and atherosclerosis in a whole colony of mice simply by introducing a stranger."[313]

Elements of Sterling's argument appear to make sense; however, his concern

[310] Ibid., 19-20.
[311] Ibid., 20.
[312] Ibid., 20.
[313] Ibid., 20.

about strangers recalls Wolf and Bruhn's fear about the de-localization of Roseto: "In industrial, market-dominated societies . . . communities are large and comprised mostly of strangers who come from different cultures with different rules and often with ample historical reasons for mistrust. Furthermore, many transactions occur between strangers who will never meet again, so trust is less rewarding, and the need to sustain hypervigilance is greater. Any urban skeptic, who might consider this a baseless speculation, should recall how remarkable it seems when on a trip to the country we find that rural people don't bother to lock the door or set a car alarm – and that enough trust persists that you can pump gasoline first and pay later."[314] Sterling construes industrialization as consequent with anomie, or a breakdown of social bonds and norms.

The lineage between Sterling and McEwen is evinced both by the persistence of concepts and the metamorphosis of Sterling's "allostasis" into "allostatic load." According to Bruce McEwen, the most common stressors are those that operate chronically, at a low level that cause us to change our health behaviors, for example, causing us to "to eat comfort foods and take in more calories than our bodies need, and to smoke or drink alcohol excessively. . .to neglect to see friends, or to take time off or engage in regular physical activity. . . to take medications— anxiolytics, sleep-promoting agents—to help us cope. . ."[315] Like Sterling's model, "[t]he brain is the organ that decides what is stressful and determines the behavioral and physiological responses, whether health-promoting or health-damaging. And the brain is a biological organ that changes under acute and chronic stress, and directs many systems of the body—metabolic, cardiovascular, immune—that are involved in the short- and long-term

[314] Ibid., 24.
[315] McEwen, "Protective and Damaging Effects," 368.

consequences of being stressed out."[316] Like Sterling's hypothesis, the brain that governs behavior in this model is not engaged in the perception or assessment of stressors— stress is a social fact and subjects us to biological experiences that are out of our control. While McEwen's description of "allostatic load" acknowledges to some degree that the stress response is stimulated by any event, positive or negative; the effect of this stimulation is always negative in the long run, as "chronic elevation of these same mediators—e.g., chronically increased heart rate and blood pressure—produce chronic wear and tear on the cardiovascular system that can result, over time, in disorders such as strokes and heart attacks."[317] McEwen's construction of "allostatic load" draws upon Sterling's term "allostasis" which appears in the literature as a description of the process the body undergoes in responding to daily events and maintaining homeostasis.[318] According to McEwen, "Because chronically increased allostasis can lead to disease, we introduced the term 'allostatic load or overload' to refer to the wear and tear that results from either too much stress or from inefficient management of allostasis, e.g., not turning off the response when it is no longer needed."[319] Further, in McEwen's model, stress responses determine the structure of the brain. This may be true of everyday stressors as well: "Although there is very little evidence regarding the effects of ordinary life stressors on brain structure, there are indications from functional imaging of individuals undergoing ordinary stressors, such as counting backwards, that there are lasting changes in neural activity."[320] With these brain changes in mind, do we have any hope of recovering from everyday stress?

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[316] Ibid., 368.
[317] Ibid., 368.
[318] Ibid., 368.
[319] Ibid., 368.
[320] Ibid., 375.

According to McEwen's sources, positive affect is associated with lower cortisol production, high self-esteem with the ability to habituate, i.e. lower cortisol responses on repeated exposure to the same stressor, while loneliness is associated with higher cortisol responses to waking in the morning.[321] Some of these factors appear to be emotional states, however others are perhaps immutable, individual traits. Social epidemiologist Nancy Krieger has emphasized that the connection of racial and other types of discrimination to negative health outcomes takes "literally the notion of 'embodiment'. . .how we incorporate biologically—from conception to death—our social experiences and express this embodiment in population patterns of health, disease, and well-being."[322] Racism operates directly on biology as "chronic psychologic stress."[323] Recalling Freudian psychoanalysis, Krieger explains that a difference between words and somatic evidence may occur because the body is "revealing experiences—translated into pathogenic processes—that people cannot readily articulate with words."[324] The most frequently identified example of the "embodiment" process she describes is high blood pressure or increased heart rate. In this framework, researchers can use the body to detect stressful exposures, even if informants are not consciously aware of them. Both McEwen and Krieger imply that alterations in biology, perhaps manifesting in disease, predictably proceed as a result of the physical body's contact with the modern social milieu.

Conclusion

Durkheim's definition of culture is a persistent and powerful influence on stress

[321] Ibid., 376.
[322] Krieger, "Discrimination and Health," 36-39.
[323] Ibid., 46.
[324] Ibid., 59.

research in the social sciences. His appearance as a reference in contemporary publications on stress has the effect of making our present knowledge seem permanent; however, it may also signal a constraint on our thinking. According to cultural anthropologist Robert Brightman: "Organic metaphors of wholeness and the methodology of holism . . . both favor coherence, which in turn contributes to the perception of communities as bounded and discrete."[325] As several cultural anthropologists have concluded, it is perhaps impossible in the present to divide cultures into discrete units; rather, there is significant intercultural flow.

From Selye's philosophy of gratitude to research in social epidemiology in the present, the holistic perspective defines culture as a characteristic of interpersonal interaction which serves to regulate and determine the behavior of human actors. Individual human actors, subjected to these forces, are interchangeable within the model. Social support and social cohesion persist as operationalized constructs that measure the degree to which individual aspirations conflict with community norms.

Cultures are homogenized and external influences are portrayed as detrimental to health in stress research because they constitute threats to stability at both the macro and micro level. Culture change is a threat to biological homeostasis and a cause of disease. As has been shown, the focus on interpersonal relations as a cause of physiological stress has a long history, but is it still useful to us in the present? The assertion that pathological over-activity of physiological systems occurs in response to "strangers," implies that is unhealthy to live in diverse communities. This should strike us as fundamentally problematic.

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[325] Robert Brightman, "Forget Culture: Replacement, Transcendence, Relexification," *Cultural Anthropology* 10(4) (1995), 531.

Durkheim's imprint may also explain the persistent gap between the approaches of sociological and anthropological approaches and the approach of cognitive psychology to the study of stress. A primary critique of Durkheim and his progenitors has been the inflexibility of this school of social theory toward human agency. Sociological and anthropological approaches, concerned with measuring macro-level stressors like modernization remain separate from psychology's concern with the motivations of individual persons. However, it is increasingly clear that there is a biological relationship between the activation of the stress pathways and cognition or individualized appraisal of stressful circumstances. Consequently, these perspectives are arguably at a point at which true convergence would confer mutual benefit.

As chapter three detailed, the psychosocial stress hypothesis has served as an explanation for racial health disparities. In the history of this framework, African-Americans are seen as victims of social (dis)organization. This contrasts with the perspectives of critical race theory and post-colonial studies that have significantly complicated the construction of victimhood by underlining the persistent phenomenon of resistance even in conditions of very severe constraint on human choices. The psychosocial stress hypothesis applied as an explanation for health disparities construes stress-related pathology as inherent in the social and physical environment despite the actions of individual group members. Therefore, the remedy not only lies outside of African American action, but it also cannot be located in a centralized state. I think it is worth asking if the conclusion of the psychosocial stress hypothesis has not resulted in the opposite of its intended effect. By situating the cause of chronic disease amid characteristics of culture, the hypothesis at once releases agents from failures of self-

regulation, but also confers social groups with vulnerability by constructing them as passively subjected to determining forces.

Bruce McEwen's statement that the heart is "an exquisitely sensitive organ" is consonant with prior research positing the sensitivity of the cardiovascular system to social interaction. Two books by James J. Lynch, *The Broken Heart: The Medical Consequences of Loneliness* (1977) and *The Language of the Heart: The Body's Response to Human Dialogue* (1985), emerge as connected to stress research.[326] Lynch argued that organisms are not separate or isolated units of analysis and are not "wired for self-preservation," rather "social support and loving relationships are conducive to good health. . . [and] human loneliness is a major cause of premature death."[327] Building on the later work of sociologist Stewart Wolf, principal investigator of the Roseto Study, who had detected increases in blood pressure during interviews about life stresses, Lynch found that communicative difficulties may also be a significant cardiac risk factor.[328] Thus, for Lynch the "cardioprotective nature of healthy dialogue," underscored the enduring hypothesis that frustrated human emotions have a way of damaging the body, the heart in particular.

Are there a limited number of times that we can adapt to our circumstances, or are humans characterized by our plasticity? In considering whether we want to see the human body as vulnerable or resilient, we should consider to what degree the activities of the stress response system are either adaptive or pathological. A detailed look at Hans

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[326] See James J. Lynch, *The Broken Heart: The Medical Consequences of Loneliness*. (New York: Basic Books, 1977), 1- 271 & James J. Lynch, *The Language of the Heart: The Body's Response to Human Dialogue* (New York: Basic Books, 1985), xii-349.
[327] Lynch, James J, "Decoding the language of the heart: Developing a physiology of inclusion," *Integrative Physiological & Behavioral Science* 33(2) (1998), 130-137.
[328] Lynch, "Decoding the language of the heart," 133.

Selye's view of stress reminds us that these constructs are ends of a spectrum in which stress researchers may occupy a position to the left or right of the center. There is not, and does not have to be, a continuous lineage between early stress researchers and those in the present.

Across the history of stress research and at this moment, social theory is intimately entangled with health outcomes and the constructions of biological fitness and adaptation. These two perspectives are mutually reinforcing. The connection of social cohesion with heart disease imbues the restoration of the "healthy" configuration of communities with an urgent imperative. Likewise, biological research in the domain of health disparities offers basic science as an applicable solution to present day social problems. Reviewing each agenda side by side in historical perspective makes evident their mutual influence upon one other and reveals our present knowledge about stress to be merely a particular characterization of the relationship between our biology and our environment and not an unassailable truth.

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